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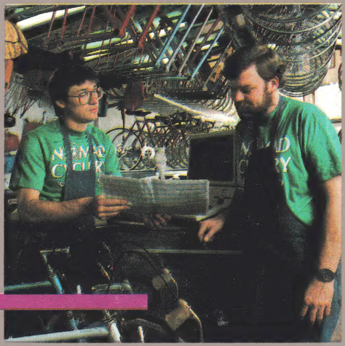
Personal Computers in Business

An Introduction and Buyer's Guide



Personal Computers in Business

An Introduction and Buyer's Guide

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DIRECTORY OF BANK SERVICES

About This Book

If you're like most business people, you know very little about computers, personal or otherwise. (You might even prefer to keep it that way.) But you also know that, within the next few years, computers are likely to be necessities in even the smallest business ventures. If you haven't taken advantage of computers by then, you can be sure your competition will have—but by that time you'll be running to catch a fast-moving train.

So we've written this book for you: to acquaint you with personal computers, show you how they're used in businesses (large and small), and how to buy one. It won't make you an overnight computer expert, but it will help you ask questions and listen more critically to computer dealers.

We've made it nontechnical because we want to make the personal computer understandable. We've also tried to be as objective as possible, because we believe that the more you know about personal computers, the better equipped you'll be to evaluate different personal computer systems. Then it will be easier for you to see why, in spite of growing competition, Apple personal computers are the best selling personal computers in the world.

How a Personal Computer Can Improve Your Business

If the idea of computerizing your business intrigues yet baffles you, you have lots of company. In the few short years since portable, affordable computers were introduced, business people everywhere have viewed the personal computer, this "bicycle for the brain," with a mixture of excitement and at least a little reluctance.

And understandably so. Until a few years ago, computers were simply too big and costly for any but large companies to afford, and often so complex that only highly specialized systems analysts and programmers could operate them. It was easy to conceive of the personal computer as a valuable management tool that could help people cut costs, increase productivity, and make better management decisions. But how?

Today, we have the answer. Personal computer systems now pack more computing power than their room-size forebears, cost less than an office copier, and fit comfortably on a desk top. Excellent, off-the-shelf computer programs streamline a wide range of business tasks—financial modeling, accounting, word processing, statistical analysis, and many more. Most of these programs are easy to use, since they have been designed for the executive, manager, professional, and small business owner with little or no computer experience.

How Personal Computers are Used in Business

One of the real beauties of the personal computer is its versatility. Unlike "dedicated" computers designed to perform a single task (word processing, for instance), the personal computer is something of a general purpose, electronic workhorse, able to perform a wide range of tasks with extraordinary speed and accuracy. In business, you'll find it applied most frequently to modeling and forecasting, graphic illustrations, word processing, data base management, accounting, training, and communications.

Modeling and Forecasting

The speed with which the personal computer can perform complex calculations makes it a valuable tool for managers, planners, and analysts involved in financial modeling and forecasting—examining the corporate past and predicting the corporate future. As an "electronic worksheet," the computer replaces the laborious spreadsheet-and-calculator method of planning (or costly timeshare-system planning). It offers managers a better means of exploring the "what-ifs" of different business situations. It also allows them to develop more accurate business plans, sales and cash-flow forecasts, department budgets, product and marketing strategies, and material and labor estimates. Sophisticated mathematical formulas are built into the better modeling programs, so the computer does all the calculating and recalculating work when different assumptions are tested.

Graphic Illustrations

Computer-generated graphs, charts, and maps have become valuable decision-making tools for managers who otherwise would have to digest and interpret truckloads of statistics generated by computer printouts. Easy to produce and easy to understand, graphs and charts prove particularly useful in monitoring performance, spotting trends, and evaluating business opportunities. They also serve as valuable communication tools. Graphics programs designed for business use can convert virtually any numeric information—profit and loss, gross margin, forecast, sales, budget, cash flow—into presentation-quality bar, pie, line, and scatter graphs.

Word Processing

What the electronic calculator did for the number, the word processing computer has done for the written word. It has shortened, practically exponentially, the time it takes to produce and edit memos, personalized form letters, reports, even book-length manuscripts.

Far removed from the humble manual typewriter, the computer takes advantage of a television like screen to display text before it's printed. This way, it's possible to edit a document—add sentences, delete or move paragraphs, correct spelling errors, and search for and replace words—in a single operation, before text is committed to paper. A printer, linked to the computer, then produces letter-perfect copy.

The computer can also store written information so it can be edited and updated whenever necessary. The text stored by the computer is as easy to update as it is to edit. And the printer can produce letter-perfect copies of each updated text.

Data Base Management

In computer jargon, filing information electronically is given a rather complex name: data base management. Data base management systems keep records (of personnel, sales statistics, marketing survey abstracts, for example) that can be easily updated and manipulated in various ways.

If you own a small business and maintain a computer list of several hundred customers, you might use it to generate mailing labels for a special promotion, review purchase activities for the fourth quarter, or send a letter just to customers with certain zip codes.

If you are a manager or executive of a large business, you might use a personal computer to draw on department-maintained data bases that store financial information as well as abstracts of professional journals.

And, by linking your computer to data bases stored on larger, mainframe computers, you can tap into more complex information banks.

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Accounting

Accounting by computer streamlines the five most basic business functions: general ledger, accounts receivable, accounts payable, sales invoicing/inventory control, and payroll. Besides cutting the time that it takes to do the same work by hand, computerized accounting offers businesses an opportunity to improve cash flow management, boost the collection rate of receivables, plan payments to take advantage of vendor discounts, and maintain inventory levels that minimize cash investment and improve customer service. Who stands to benefit most from personal computer accounting systems? The small business owner or bookkeeper who ordinarily handles the books, or whose books go to an accountant or bookkeeping service bureau each month or quarter.

Training

A personal computer is a masterful training tool. Programs are available that make it easy to develop dynamic instructional materials. These, in turn, open the door to new, more creative approaches toward improving employee performance and productivity.

The personal computer is the teacher. Sales, management, and service employees learn in a one-on-one, self-paced environment in which the computer actively prompts, monitors, and tests for understanding. And the teacher is quite talented—it can blend text with sound, graphics, color, simulations, and video technology. Besides increasing learning retention, Computer-Assisted Instruction (CAI) and Computer-Assisted Training (CAT) programs make better use of meeting time, fit more readily into demanding executive schedules, and travel to branch offices more economically than do training personnel.

Communications

To extend the potential of the personal computer, many business people link it, usually by telephone, to an interoffice "network" of other personal computers, to data bases stored in large, mainframe computers, and to information services provided by commercial computer networks. These communication links allow managers to share data bases and models used in business planning, to speed delivery of correspondence by electronic mail, and to draw on information found in large, complex data bases.

It's unlikely, of course, that you'll use a personal computer for all these functions. As a manager, you might rely on a personal computer to help you develop business models and budgets. Or you might use it to produce graphs that compare actual sales against forecasts, or expenditures against budgets. As a small business owner, you may depend on a personal computer to automate your accounting procedures or to generate letters and mailing labels for direct mail advertising. For attorneys and writers, the personal computer is an obvious route to streamlined preparation and editing of lengthy documents.

Bottom-line Benefits

What makes a personal computer valuable? The fact that it can accomplish so many different tasks—and with such speed and accuracy—that it greatly increases personal productivity. With the computer handling the tedious, repetitive activities that produce most business bottlenecks, you and your staff are free to pursue more creative, productive tasks—tasks that make your business grow.

What's in a Name?

Personal computers. Microcomputers. Desktop computers. Small business computers. Microcomputers. Minicomputers. By these—or any other name—computers essentially do the same work: process thousands of instructions in millionths of seconds. They're a little like automobiles, varying less in function than in physical appearance, power, and price.

A few years ago, when economical, compact computers were introduced, people distinguished them from traditional mainframe computers with names like "microcomputer" and "minicomputer," referring as much to the computer's physical size as to its computing power. Today, however, if you had to draw dividing lines between "sizes" of computers, they would have to be pretty fuzzy ones. With advancements in technology, many of the smallest computers are more capable than room-size ones built a few years ago.

The personal computer, for example, contains all the circuitry of the large computers several years back. This circuitry is located on just a few chips, each smaller than your fingernail. Actually, today's minicomputers may duplicate or even exceed the power of mainframe computers that only a few years ago required their own climate-controlled rooms. Of course today's mainframes or "megacomputers," even though they're physically smaller than the mainframes of yesteryear, far outstrip the most ambitious minicomputers. The fastest (and most expensive) computer in the world, for example, is about the size of an upended sports car.

It's not physical size, though, that determines the effectiveness of a computer. Brainpower (memory size and the speed with which the computer can carry out instructions) as well as utility (what the computer can accomplish) are better measuring sticks.

In terms of power, the flexible, compact personal computers (otherwise known as microcomputers and desktop computers) lie at one end of a continuum that is constantly changing. Farther along, yet somewhat overlapping in functions, are the more expensive and powerful minicomputers that handle the complex data processing needs of large corporations. At the far end are the megacomputers used to help launch space shuttles and build sophisticated econometric models.

Improve Efficiency

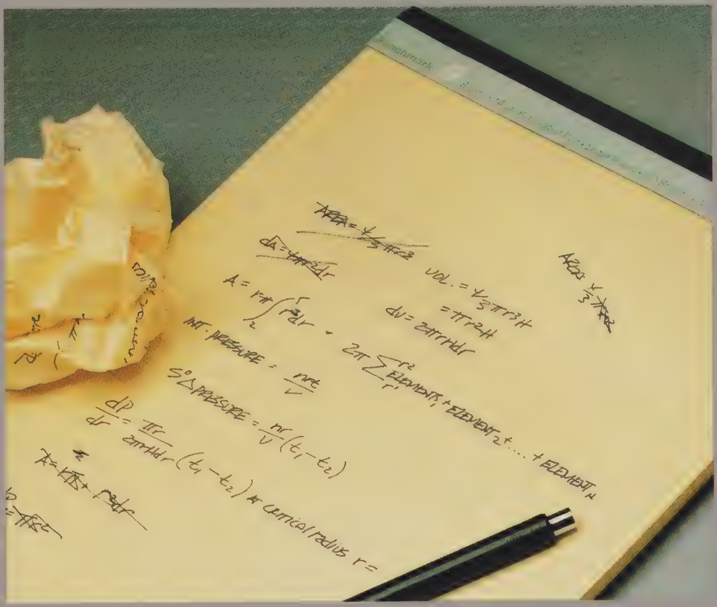
Working with computer-stored records, you reduce the time it takes to manage paperwork. For example, by transferring accounting tasks to the computer, you no longer need to maintain hand-written journals of receivables, sales, inventory, and the general ledger. The computer will maintain them for you and generate printed reports as well.

At the same time, you no longer need to manually update each accounting journal when you sit down to record invoices or cash receipts. Simply enter the new data once, and the computer performs calculations, feeds new information into appropriate accounts, and, when you specify, generates a printed invoice and/or report.

Reduce Errors

With aggravating predictability, costly errors manage to slip past even the most watchful executive. Often these errors are the result of manually recording information incorrectly, of miscalculating, or of typing mistakes into reports. With the help of the computer, however, you can significantly narrow your margin of error.

The computer virtually eliminates mistakes that result from miscalculating, because it automatically performs, with unfailing consistency, complex calculations. In addition, watchdogs built into programs can call your attention to incongruous data or unrecognizable information you've entered, or to words whose spellings don't match those in the program's extensive vocabulary. Immediately, you have an opportunity to validate the information or correct what otherwise might prove to be an expensive oversight.



Cut Costs

Using the computer to monitor expenditures more closely, you can learn where to trim fat in overhead, provide tighter budget controls, speed your billing cycle, and take advantage of discounts offered by vendors. If you handle inventory, you can use the computer to help you place more timely orders, project more accurately what stock levels you need, and order in more economical lot sizes.

Make Better Decisions

Obviously, modeling and forecasting programs are tools for good decision making. So are the computer's summarizing capabilities. They enable you to absorb information from a much larger pool of data than you could have were you to rely on your own statistical resources and manual calculations.

Because the computer can manipulate that information quickly, it can point out subtleties you may not otherwise notice. And the information is consistently accurate. In addition, it provides unlimited opportunities for examining "what-if" situations. You'll also find it easier to spot trends and troubles with fewer uncertainties. The result? Sounder, more effective management decisions.

Increase Profits

As you use the computer to help you manage your resources more effectively, reduce errors, and cut costs, you'll also increase your profit margin.

Modeling and forecasting programs are good examples of this. They enable you to examine various business decisions before committing to the one you think will prove most profitable. When comparing several investment opportunities, for instance, you can use the computer to rapidly test assumptions that identify potential rates of return, production costs, labor and material requirements, cash flow, and other variables that affect profits.

Improve Customer Service

You'll measurably improve the quality of service your customers receive when you use the computer to keep track of orders and inventory. You'll also substantially improve turnaround time on orders, provide more detailed account statements, and be able to set up different discount and credit systems tailored to customer needs. With the computer, you're in a better position to know who has placed orders, where they are, and which have been filled.

Increase Productivity

Perhaps the most satisfying contribution the personal computer makes in business is at the individual level—improving the *quality* of the work experience. It brings computer intelligence to people, helping them manage more efficiently, more creatively, and more effectively.

For the manager developing business plans, the manufacturer planning material requirements, the small business owner tracking sales—for business people in every profession, at every level of management—the computer becomes one half of a man-machine partnership. It is available for tens of thousands of different, personal tasks that open the door to better ideas and a more pleasurable journey.

The View From Pepperidge Farm

At Pepperidge Farm in Norwalk, Connecticut—where they're said to make the breads like Grandma used to bake—founder Margaret Rudken's ancient black stove is proudly on display in the lobby. But behind the scenes are mainframe computers and, in the offices of managers, personal computers in growing numbers.

Peter J. Zezima, manager of business systems, says the personal computers purchased for managers at Pepperidge Farm are being used for everything from market forecasting to production scheduling, and from labor analysis to simulations and profit/loss analysis. In fact, the company's own list of personal computer applications exceeds 900.

The personal computers have had an almost revolutionary effect upon many of the company's departments. Zezima says, "In the past, business reports and applications that used to take days can now be done in hours and minutes. The systems have been extremely cost effective.

"You can run a business more efficiently by putting computer power in the hands of the people who make the decisions. And it's a lot easier to teach a manager to use an Apple than it is to teach a computer specialist how to run a firm."

Apparently the management of Pepperidge Farm agrees. The firm now has more than 300 trained personal computer users, and is in the process of linking all their personal computers into a single communications network supported by a large central computer. The network, Zezima says, allows for electronic mail, as well as shared word processing, graphics, and distributed processing.

Deering's California Codes
Deering's California

Personal Computers for the Manager/Professional

By the light of the silvery CRT*, then, you have opportunities for huge gains in productivity. As a manager, you will realize these gains in the preparation and presentation of corporate budgets and forecasts, in report writing, record keeping, and communications.

As a professional—particularly if you are in accounting, financial planning, and tax consulting—you share with managers the need for the computer's calculating powers. You share, too, with the small business owner and entrepreneur, the need for sound, automated accounting systems. So it is with professionals in medicine, law, and architecture. They view the personal computer as a route to more accurate client records, improved report writing, more efficient project coordination, and increased research capability.

Thousands of programs have been developed for the personal computer to meet the general and specialized needs of managers and professionals in virtually every type of business. Most of these programs, however, are directly related to, or are hybrids of, the applications described in the next pages.

Financial Modeling and Forecasting—Let the Computer Crunch Numbers

What if you had taken an overseas assignment? What if you had married? Or married someone else? What if you had pursued a career in music rather than management? What if you had(n't) missed that phone call?

Everybody speculates. At one level, "what if?" is an exercise in fancy. In business, though, what-ifs can literally be $64,000 questions. At the core of financial models and forecasts, what-if questions are crucial to a company's strategic management. They teach a company about its past, its future, its profits, its market position, its competition. How they are handled can make the difference between prosperity and survival.

Until recently, managers and executives responsible for financial models and forecasts had to develop them by hand if they didn't have easy access to mainframe computers. The introduction of "micromodelers," though, has placed the power of those mainframe financial modelers in the hands of anyone with access to a personal computer.

Planning by Computer

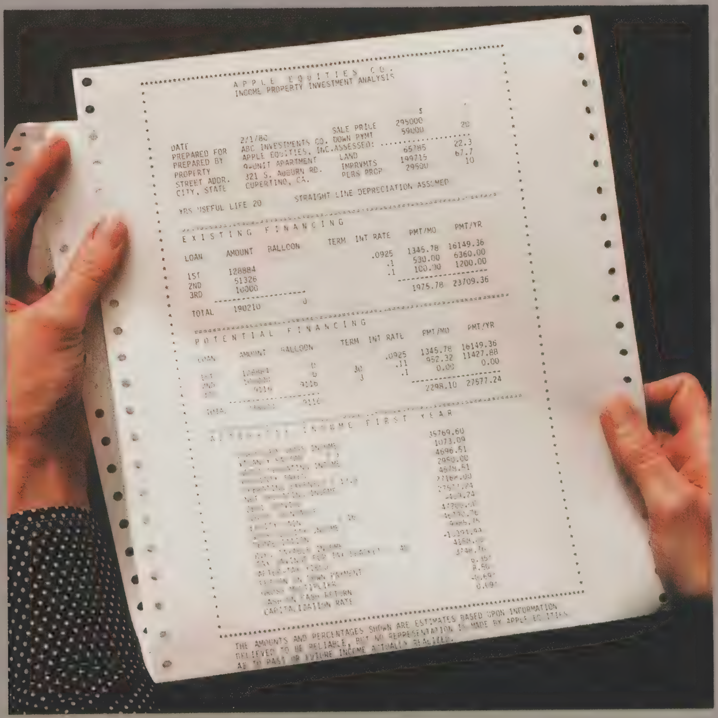
Some of the personal computer's success is due to the sophisticated financial modeling programs that have been written for it. Described as "worth buying a computer for," these financial modeling programs have virtually revolutionized business planning. Easy for the novice to use, they have dramatically reduced the time it takes to develop budgets, sales plans, forecasts, cost analyses, investment analyses, P&L projections, schedules, and cash flow projections.

More important, however, modeling programs and the personal computer improve the *quality* of management decisions. They allow management to absorb and manipulate mountains of computational ore quickly and accurately ("crunch numbers" in computer jargon). As a result, managers are freed from the calculations and clerical work involved in manual planning. They have more time to develop data, examine strategies, and consider strategic alternatives. With access to more timely and complete information, they also can make more reliable projections.

Chances are, whatever task you can perform with a calculator, pencil, and spreadsheet, you can handle more efficiently with a personal computer and an "electronic worksheet."

In Electronic Worksheets VisiCalc® is King...

"Electronic worksheet" is a term synonymous with computer modeling. Replacing calculator, spreadsheet, and pencil, it offers managers, as we've said, a way to project the company's future and test different assumptions without having to perform



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Financial modeling programs developed for the personal computer have dramatically reduced the time it takes to develop budgets, sales plans, forecasts, projections, and schedules.

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*CRT, the cathode ray tube used to display information on a computer screen.

tedious hand calculations, lay out spreadsheet after spreadsheet, or understand computer programming.

One of the most celebrated electronic worksheets is VisiCalc, the first and most widely used financial modeling program created for personal computers. Developed by Dan Bricklin and Bob Frankston, two Harvard Business School students who wanted a better way to analyze case studies, it was published by Personal Software, Inc. (now VisiCorp) in 1979. Since then, VisiCalc and other electronic worksheet programs have made financial modeling the darling of personal computer applications, largely because of their "instant erase and recalculate" facility.

Since VisiCalc first appeared, a raft of competititve programs has swept into the market, each with features unique to its intended audience.

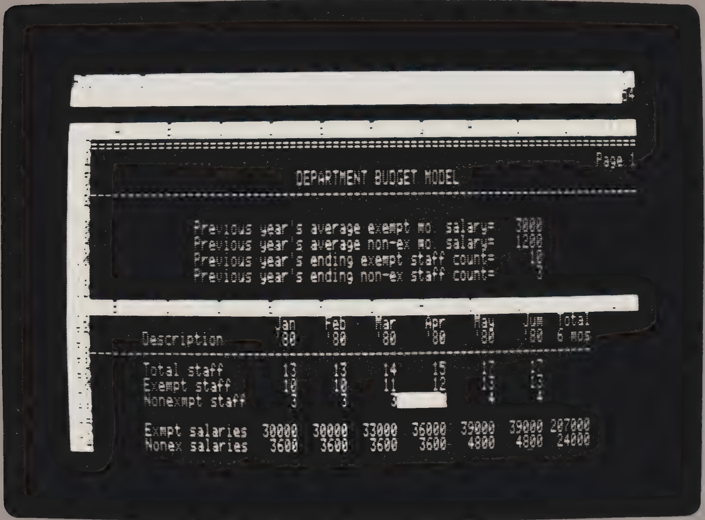
How VisiCalc Works

Basically, VisiCalc—like most other financial modeling programs—works like this: The computer's television like monitor serves as a "window" onto a blank worksheet that resembles a huge columnar pad. The worksheet is organized into a regiment of rows and columns. (The VisiCalc worksheet is 63 columns wide, 254 rows deep.) When using the worksheet, you can insert one of three types of information—words, numbers, or formulas.

Suppose, for example, you were constructing a budget. Rather than write down column headings across the top, and budget categories down the side of a sheet of paper, you would use the computer keyboard to enter the same information into the computer. The computer would display this information, in a worksheet format, on the screen.

As you enter formulas and numeric information, the computer manipulates it according to your instructions. The computer can, for example, take a figure you specify for one month and insert it into every subsequent month for the same category. It also can provide horizontal and vertical totals and subtotals, calculate one set of figures on the basis of another (such as salaries as a function of base wage plus commission), and recalculate instantly as you explore what-if assumptions. What if labor costs rise seven rather than five percent? What if the department adds another production supervisor in the second quarter? What if the cost of employee health insurance increases?

Once the budget is constructed to your satisfaction, the computer can store it for you, and, when linked to a printer, produce a presentation-quality copy. To update the budget or use it to compare actual against projected costs, you can retrieve the model from computer storage and insert new data; the computer automatically recalculates.



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                                                        Page 1
                      DEPARTMENT BUDGET MODEL
------------------------------------------------------------------

          Previous year's average exempt mo. salary=   3000
          Previous year's average non-ex mo. salary=   1200
          Previous year's ending exempt staff count=     10
          Previous year's ending non-ex staff count=      3

                       Jan    Feb    Mar    Apr    May    Jun  Total
  Description          '80    '80    '80    '80    '80    '80  6 mos
  ------------------------------------------------------------------
  Total staff           13     13     14     15     17     17
  Exempt staff          10     10     11     12     13     13
  Nonexmpt staff         3      3      3             4      4

  Exmpt salaries     30000  30000  33000  36000  39000  39000 207000
  Nonex salaries      3600   3600   3600   3600   4800   4800  24000
```

...But It's Not the Only Kid on the Block

Since VisiCalc first appeared, a raft of competitive programs has swept into the market, each with features unique to its intended audience. Some of these programs make it possible to perform a wide range of complex calculations, build models of virtually any size and format, consolidate several different models, and transfer data from one model to another.

Most electronic worksheets, for example, give you the option of plugging your own formulas into your model, or using standard calculations that have been built into the program—such as SUM, MIN(imum), MAX(imum), AVERAGE, PCT (percent), and various trigonometric functions. Most programs also allow you to examine and work with two different sections of your worksheet at the same time. In these instances, the computer screen is divided into two windows ("split screen" is the official name for this operation).

In addition, some modeling programs provide built-in advanced functions that include sophisticated statistical analysis techniques. One program calculates three kinds of depreciation, as well as compound growth rate, net present value, and linear regression forecast. Another is geared to real estate investment analysis, calculating amortization as well as mortgage loan analysis options. Still another allows managers to generate fitted curves and moving averages, create "smoothed" data, compute standard deviation, and perform multiple linear regression.

Several micromodelers also let managers consolidate models or sections of models, exchange formulas, and share data, such as regional sales figures stored in different locations.

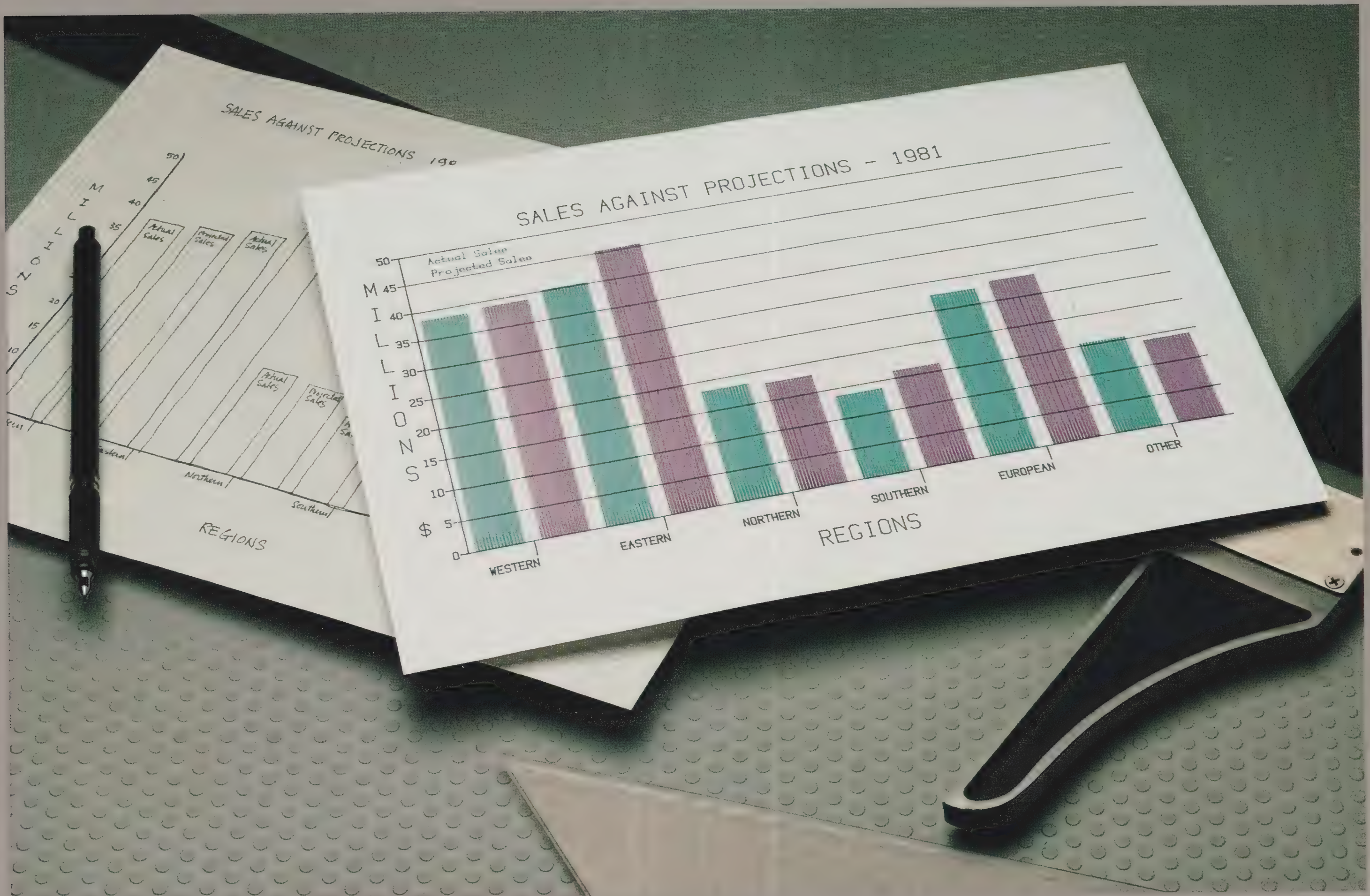
Business Graphics—Pictures Worth a Thousand Printouts

Like personal computers and mainframe computers before them, computer graphics once was the domain of the scientists and engineers who produced the technology—and the few companies willing to pour time and big dollars into making that technology tractable. But because of its value as a decision-making tool, computer graphics is expected to become a favorite of business in the next few years.

With the introduction of low-cost computer graphics programs, managers and executives now can convert the endless streams of numbers on computer printouts into useful, easily understood graphs and charts. These graphs and charts help them spot trends, pinpoint problem areas, and make better business decisions.

The Manager as Artist

To the manager overloaded with work and pressured to make quick decisions, simple pictures



With low-cost computer graphics programs, managers now can use the personal computer to convert data from computer printouts into easily understood graphs and charts.

offer a welcome alternative to a steady diet of statistics. For that reason, managers and executives have in computer graphics two increasingly indispensable services—summarizing data for everyday management and planning problems (information graphics), and providing quality visual displays for reports and presentations (presentation graphics).

Information Graphics

The computer can give managers an easy way to identify trends by producing graphs that weigh expenditures against budget allocations, track product performance, compare actual sales with projections, gauge the impact of competition on business, and chart stock and production activities.

A valuable tool in marketing and corporate planning departments, computer-generated graphs can be used to examine investment alternatives, comparing each for return on investment, return on sales, gross margins, and cash flow.

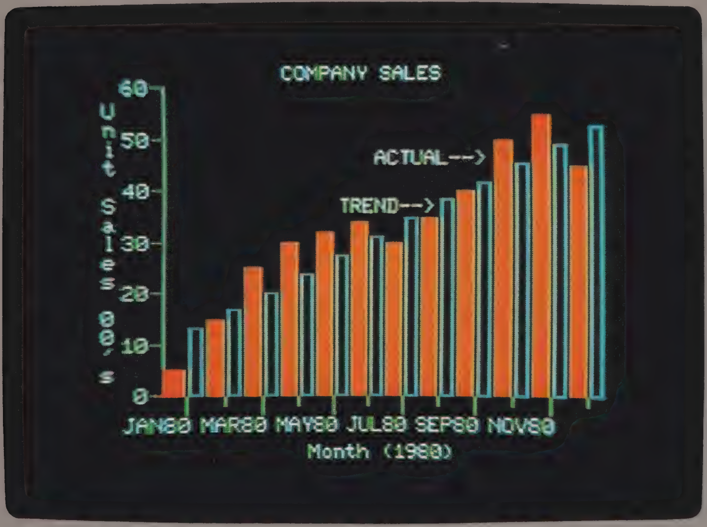
Evaluating several opportunities for investments exemplifies the what-if? function of computer graphics in planning. Since the computer can graphically display data with such speed, it's easy for managers to play the what-if game with different scenarios that may involve manpower projections, acquisitions and mergers, budget allocations, and revenue increases.

Presentation Graphics

For years managers and professionals have used artists to produce high-quality color graphs and charts for presentation, particularly in the boardroom. But visuals produced by computer and used for presentation have three distinct advantages over those prepared manually: cost, speed, and accuracy.

For presentation purposes, computer-generated graphs are usually converted into printed illustrations (or into acetate for overhead projection) through devices called plotters (many of which provide color). Another device works like an oversize camera, translating graphs into slides for screen projection. Some programs allow the computer to transmit images directly onto the boardroom's projection television screen.

Training department managers, in particular, find they can easily produce, edit, and update materials for classes and seminars without having to commit themselves to the cost and tedium of manually redoing existing visuals.



How To Draw With a Computer

The procedure for developing graphs with a computer is quite simple. You use the computer's keyboard to feed data and simple commands, such as "draw bar," "label," and "fill," into the computer. The computer arranges the information into pie charts, line graphs, scattergrams, or horizontal or vertical bar charts for display on the computer's monitor. With some systems you also can create diagrams and freehand illustrations.

Attached to a printer or plotter, the computer can generate page-size illustrations, either in black and white or full color. Linked to other equipment, the computer can also be used to produce slides and films for screen projection.

Features to Look For

With the business person in mind, over 80 graphics programs have been developed for personal computers. To one degree or another, they let you:

- create a variety of graphs and charts, including bar charts, pie charts, scattergrams, and line graphs;
- plot several sets of data on each graph;
- customize graphs with any number of horizontal and vertical floating labels (some programs provide a variety of type fonts and sizes);
- adjust the scale of the graph to suit your needs;
- make use of data created with other programs (especially electronic worksheets);

- perform statistical analysis to determine minimum, maximum, sum, mean, standard deviation, and variance;
- establish data trends through fitting least squares as well as several types of curves;
- operate ("drive") a wide range of different printers and plotters.

Data Base/Mail List Management: A Quantum Leap in Record Keeping

How do you handle information? An address book? A box of three-by-five cards? Cabinets of file folders? Each of these is a "data base"—a collection of related information. So is your telephone directory, or classified advertising section of the newspaper.

Data base management systems are the computer's way of handling information. As we mentioned earlier, the term itself is computerese for electronic filing or record keeping. Working with computer-stored files, you store, sort, collect, and summarize information in ways that you couldn't or wouldn't do by hand.

Case in point: You are a financial planning consultant with clients located in cities scattered across the country. You're planning a series of seminars on investments and want to send announcements to your clients in New York first. You could create your invitation list by thumbing through the cards in your three-by-five file—starting with the A's and looking at each entry. This approach would probably take awhile, because you haven't organized your clients by their locations.

Working with a computer-stored client list, however, you could ask, "Which of my clients has a New York address?" and have accurate results within minutes. The computer's fingers, if you will, do the walking through your data base.

Besides keeping mailing lists and targeting mailings, it's possible to develop sales summaries by product, salesperson, customer, or region; keep track of the contents of professional journals and magazines; maintain client portfolios, price lists, and any other lists you like. Virtually thousands of data bases exist; a data base management system is simply a way of storing them for use in different ways.

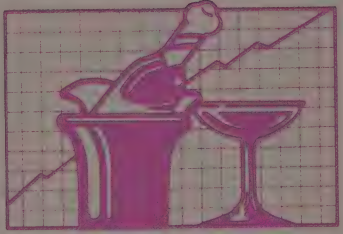
View from the Vineyard: Domaine Chandon

"It started about two years ago, just before the crush. Ideally, we like to be able to track each grower's grapes, where they are at any one point, what the composition of our juice is, and what tank it's in. We've always done that—but rather laboriously—and I thought it would be nifty to have a microcomputer around to see if we could keep on top of things."

So John Wright, president and chief executive officer of Domaine Chandon—producer of one of America's finest sparkling wines—drove over the mountain from California's Napa Valley and bought his first personal computer.

At first the computer was regarded disparagingly as "John's Toy," and its arrival at the height of the grape harvest—Domaine Chandon's busiest time of year—didn't help. But once Wright began using the microcomputer to simplify planning and forecasting, the grumbling gave way to acceptance, then curiosity, and finally acquisitive endorsement.

Endorsement particularly grew when it became clear that the small computer could be used to track grapes from the vineyard to the bottle. In the past, it's been no small task manually keeping up with the production of more than 200,000 cases of sparkling wine. It requires 400 tons of grapes a day from 18 different vineyards during the peak of the harvest. It's also essential, once the grapes are crushed, to be able to find which of the eighty-seven tanks will hold more juice.

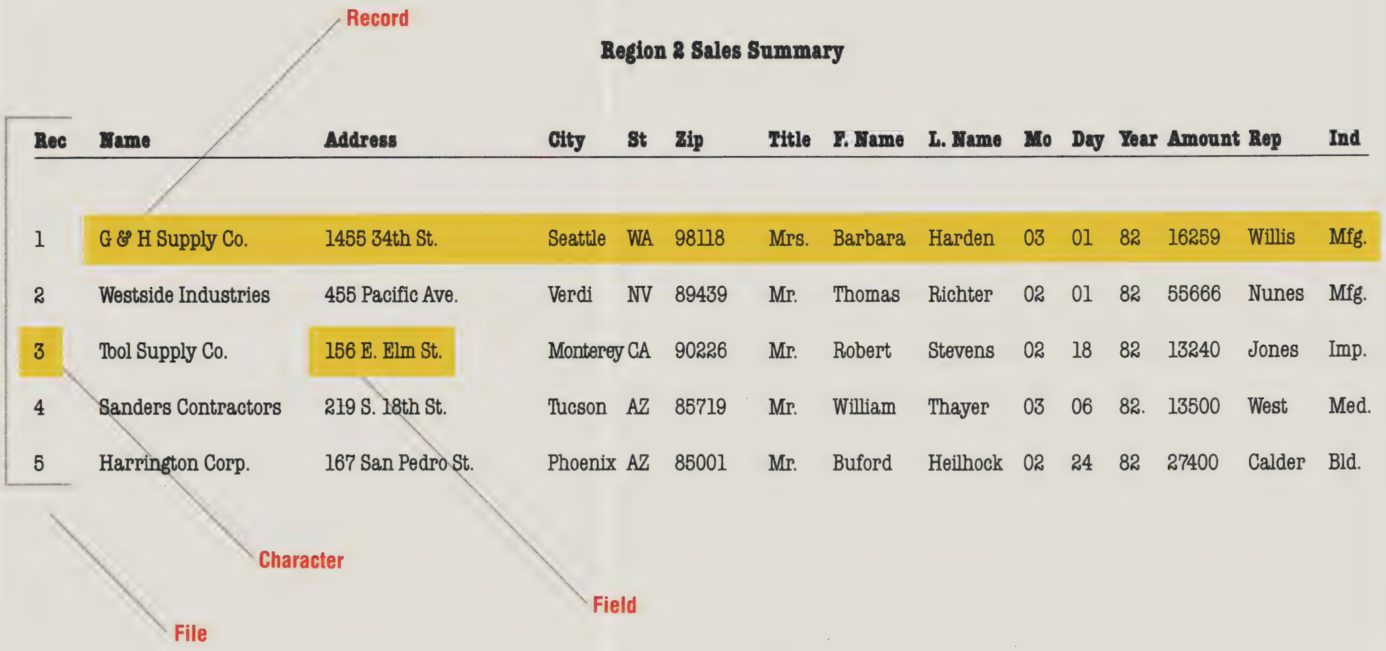


Now, in addition to the minicomputer that has long been used for accounting duties, Domaine Chandon has three personal computer systems—one that Wright shuttles between his office and his home, one used by the firm's chief financial officer, and a third in the winery itself.

All three personal computers are valued for their ability to keep track of bulk wine inventory, generate financial reports, and allow Domaine Chandon's winemaker to analyze the contents of various tanks and explore what-if? blending questions. But most important, asserts Wright, "they provide me with fantastic access to information and the ability to manipulate this information on my own in a reasonable period of time."

A clear example of this was demonstrated shortly after Francois Mitterand was elected president of France. Wright received a call from Domaine Chandon's parent company, Moet-Hennessey, headquartered in Paris: Could Wright come to Paris to discuss the effects France's new political climate might have on Moet-Hennessey's business plans? Wright had already prepared three business forecasts—Plans A, B, and C—to provide for different degrees of growth for Domaine Chandon. After the call, "I went right to the computer and produced 'Plan M' for Mitterand and had it running in half a day. I could never have done that by hand."

Customer Account Summary



Region 2 Sales Summary

Rec	Name	Address	City	St	Zip	Title	F. Name	L. Name	Mo	Day	Year	Amount	Rep	Ind
1	G & H Supply Co.	1455 34th St.	Seattle	WA	98118	Mrs.	Barbara	Harden	03	01	82	16259	Willis	Mfg.
2	Westside Industries	455 Pacific Ave.	Verdi	NV	89439	Mr.	Thomas	Richter	02	01	82	55666	Nunes	Mfg.
3	Tool Supply Co.	156 E. Elm St.	Monterey	CA	90226	Mr.	Robert	Stevens	02	18	82	13240	Jones	Imp.
4	Sanders Contractors	219 S. 18th St.	Tucson	AZ	85719	Mr.	William	Thayer	03	06	82.	13500	West	Med.
5	Harrington Corp.	167 San Pedro St.	Phoenix	AZ	85001	Mr.	Buford	Heilhock	02	24	82	27400	Calder	Bld.

How Data Base Management Systems Work

Proper coding is the key to record keeping by computer. Coding is the computer's way of indexing or cross-referencing the information it stores. In your hypothetical three-by-five box, for example, your client might show up, alphabetically, in two places: by last name and by company name. The computer's filing system is considerably more flexible, and much easier to use. It can locate your client by last name, first name, company name, title, zip code, city, state, model number, type of product, type of business, birthday, clothing size, shoe size, annual income, golf handicap… by any code you specify.

What's in a Data Base?

Information stored in any computer data base falls into four categories: records, fields, characters, and files. Consider the customer account summary above.

The row of information describing G & H Supply Co. is a *record* (a collection of information about one item). This particular record has 15 different *fields* of information; that is, the computer would lead you to G & H Supply Co. if you asked for it by record number, name, address (street name or number), city, state, zip code, and so on. You could even call up G & H Supply by asking for a *character* (a single letter or number within a field), such as: "List all companies with names beginning with 'G'." Your *file* is the collection of all records, in this case all records listed in the sales summary.

Essentially, then, using these four categories, you have a means of setting up a flexible referencing system for the information you want to store.

The Integrated Data Base

In addition to using records, fields, and characters to store and manipulate information, data base management systems can be linked to other programs. When connected to an electronic worksheet program, for example, data flows directly into a report according to the format you establish. Using the customer account summary shown above, it's possible to create a sales summary by representative, quarter, order amount, or region. The same data can also be used in a graphics program, for inclusion in comparative bar or pie charts. Or it could be used in a word processing program, to generate form letters and mailing labels. A networking program makes the data accessible to more than one computer user.

Features to Look For

There are probably more different features to be evaluated in a data management package than in most other programs you may buy for a personal computer. Standard features, however, let you:

- set up your own forms for entering and updating information;
- use a standard form that the program provides;

- retrieve records according to your own specifications, such as all addresses with a certain zip code or customers with a balance greater than $1,000;
- update selected records individually through a "search" routine, or a group of records simultaneously through what is sometimes called "global" updating—changing all records meeting a given criterion with just one command, such as entering the name of a new salesperson for a group of customers;
- change the format even though your information has already been established (you may want to add another field, for example, or expand the size of one already defined);
- compress information to take full advantage of the computer's storage capacity;
- exchange data with other programs, such as VisiCalc;
- maintain a "computed value" field for reports (an example would be the "Net Amount Due"; it subtracts the "Discount" field from the "Gross Invoice" field yet "Net Amount Due" is a field used only when printing the report—it's not kept in the record;
- produce reports with more than one line per record, and with automatic column positioning.

Word Processing: Making Fast, Light Work of Words

The marriage of typewriters and computers produced one sure approach to office productivity: let the computer do the drudge work. The computer proved it could easily generate memos, letters (even personalized form letters), reports, mailing labels, and book-length manuscripts in a fraction of the time an ordinary typewriter takes. And with fewer errors and better looks.

"Word processing" simply means that, instead of using a typewriter that prints your words on paper, you type those words into a computer, which prints your material by means of a printer—usually a "letter-quality" printer—connected to the computer.

How to Write by Computer

When you write by computer, the computer's screen displays your text and allows you to make any number of corrections and revisions before you commit it to paper. A "cursor"—a small block or arrow—is like your pencil point or eraser; it takes you forward or backward through your text. Use it to juggle words around, correct typing errors, switch phrases or paragraphs from one spot to another, delete material, insert

(Continued on page 20)

Doctor, Lawyer. . .Personal Computer

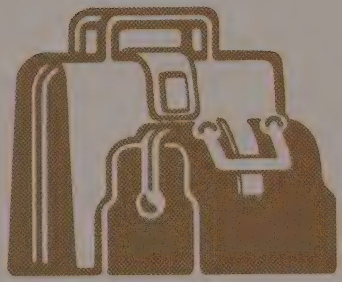
A general medical office may need to bill thousands of patients over the course of a year. What's the most painless way to present the bill?

Complex legal forms can be standard from client to client, yet still require customizing. What's the jurisprudent course of action?

From health education to timekeeping and billing, from intensive care monitoring to precedent-searching, medical and legal professionals are finding good reason to buy personal computer systems.

Until Dr. Paul Kauffman of Gillette, Wyoming, bought his first personal computer, he was "paying an accountant $1,000 a month—and I wasn't getting nearly the amount of information that I'm getting now." In Southern California, obstetrician/gynecologist Dr. Larry Stoneburner depends on his personal computer to create reports on patients who have been referred to him for special testing.

At the St. Vincent's Hospital Diabetes Center in Los Angeles, California, Dr. Leona Miller has developed a program for her personal computer that measures each patient's knowledge about diabetes. With the results of the computer's assessments, doctors and dieticians work together to "fill in the gaps," assuring that patients have the necessary information to take proper care of themselves. Other physicians are using personal computers to take patient histories, finding that many patients are less embarrassed about giving personal information to a computer than to a nurse.



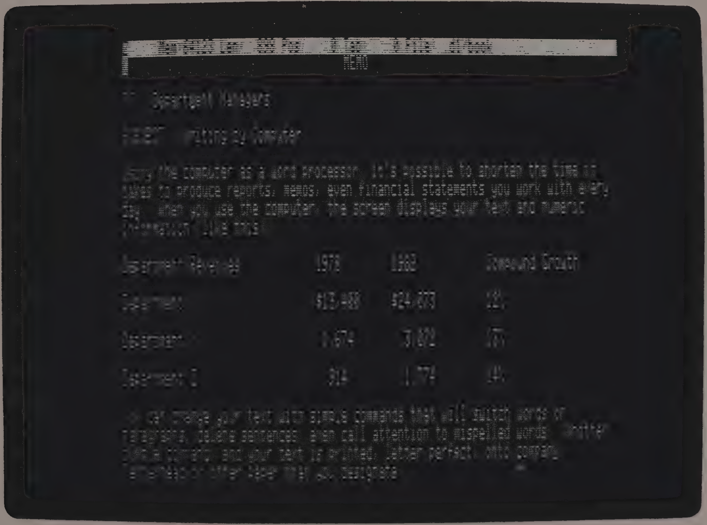
The privacy of personal computing appeals to lawyers as well—along with the more obvious financial benefits. Attorney Felix "Butch" Clayton of Charleston, South Carolina, is a case in point.

Clayton stresses that the advent of sophisticated computers that small and medium-size business can afford has brought increased client confidentiality. Many law firms that once used outside agencies for their record-keeping can now handle the task in-house. "Any time you open up your client files to the outside, you have security problems," cautions Clayton. "With your own computer, the information stays right where it belongs—in your office."

Clayton, enthusiastic about personal computers even before he bought his own, has won several associates to his way of thinking. One was a partner who "went to a symposium and came back wanting a $9000 computer system to do estate planning—until he realized he could do it all on mine." Clayton's personal computer is now being used so heavily for estate and tax planning—and billing—that he is purchasing another one for word processing.

another document, even search for and replace words you may have overused or misspelled. Once you are satisfied with the content of your writing, the computer will both store it and give you a letter-perfect printed copy, automatically.

Later, when you want to modify the document, rather than retype it from beginning to end, you can retrieve your first draft from computer storage, add or delete text as you like (the computer automatically adjusts text to accommodate your changes), and then instruct the computer to produce a letter-perfect revision. You've typed just the changes, not the whole document.



Features to Look For

The features we've just described are standard for almost all word processing systems. In addition, the better word processors adjust lines automatically to eliminate hyphenated words. They also allow you to:

- type continuously at rough draft speeds without having to worry about the carriage return, except to distinguish paragraphs;
- underline text;
- insert subscripts and superscripts;
- specify printing requirements, such as margin settings, headers, footers, line spacing, pagination, and margin justification;
- specify printing requirements for a wide range of formats, including form letters and mailing labels.

Some word processing programs designed for personal computers have advanced features as well. With these you can:

- use information generated with other programs (such as financial modeling, mailing lists, and business graphics);
- create and store different tab settings for standard letters and forms;
- use shorthand commands to insert frequently used words and phrases;
- display and simultaneously process two separate portions of a document by splitting the screen into two document "windows";
- adjust the program to customize your own word processing applications.

If spelling isn't your strength, you can find programs that scan your finished document and call your attention to unrecognized words. You then have the opportunity to verify or correct the spelling.

Printers and Print Quality

Many companies offer "letter-quality" printers compatible with all types of personal computers. Such printers generate typewriter-quality text on company letterhead, gummed labels, and forms of every possible configuration. What type of printer you choose depends on the type of documents you want to produce, as well as your budget (see "Printers and Other Computer Peripherals," pages 40–41).

Telecommunications: Around the Corner or Around the World

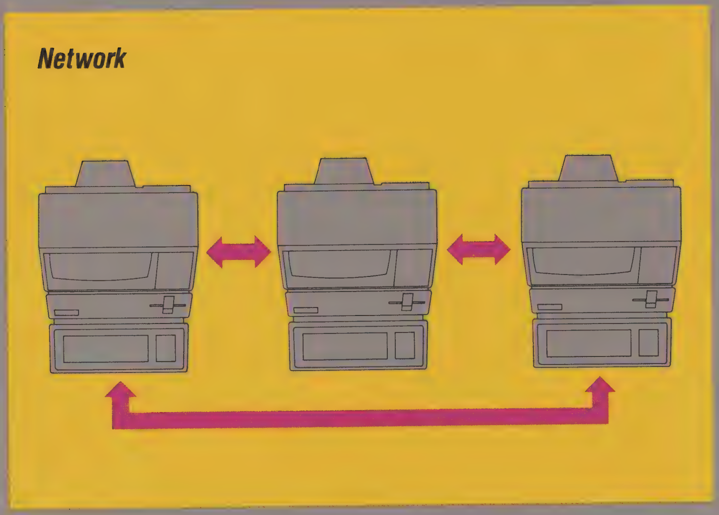
Personal computers can put you in touch with colleagues around the corner or around the world. When linked to large time-sharing systems, they also put you in touch with data in your company's central computers. And they make available information located in hundreds of different computerized "libraries" or data bases. All you usually need is an account number and a valid password.

Thus, where two or more computers are gathered together, there is a *network*—a system that moves information at high speeds. Electronic mail and information services, two products of network technology, particularly affect business.

Electronic Mail—The Fifty-Cent, Split-Second Letter

"Electronic mail" is the term for picking up and sending messages by computer. These messages include standard business letters, memos, financial reports and summaries, graphic data, and information from other programs.

Because these messages are transmitted electronically (over cable or telephone lines), computer mail systems are faster than paper-bound mailings, and they cost less. Right now, for example, it costs you more than six dollars to produce and mail a standard business letter within the United States. Producing and sending the same letter by electronic mail can run as little as fifty cents. This is because you've eliminated most of the paperwork and all of the postage. (It's possible, as well, to arrange for the computer to deliver multiple messages and copies to take advantage of cheaper off-peak phone rates.)



Network

Information Networks

Plugged into a commercial network, the personal computer is a link to any one of hundreds of data base "libraries"—each of which provides electronically-updated information on any subject from stock reports to legislation.

One of the most widely-used data bases is the Dow Jones News/Retrieval Service™. It provides all the stories on the Dow Jones Financial Wire for the previous three months, and new stories within ninety seconds after they're on the wire. The service also provides quotations for more than 6,000 securities sold on the major exchanges.

The Source℠ and Compuserve™ Information Service are two nationwide, commercial, timesharing computer networks. These networks offer more than 1,000 different information and communication services (including electronic mail). Data bases include business publication abstracts, UPI news stories (published and unpublished), domestic and international airline schedules, restaurant guides, and a wide range of financial information.

DIALOG® Information Services, a subsidiary of Lockheed Missile Corporation, is perhaps not as visible as The Source or Compuserve, but it has been in the information services business longer than almost anyone else. It provides access to 160 data bases covering every subject imaginable. The more than 60 million items available from DIALOG include abstracts from, and indexes to:

- over 1400 magazines and newspapers (including *Time, Business Week*, the *New York Times, Wall Street Journal*, and *Christian Science Monitor);*
- millions of recent books from the Library of Congress;
- financial reports and filings by publicly traded companies with the Securities Exchange Commission;
- the Congressional Record (plus information on activities of the 300 United States House, Senate, and Joint Committees and Subcommittees);
- Standard and Poor's *Daily News* and *Cumulative News*;
- almost 700 legal journals;
- over 3 million articles from the U.S. National Library of Medicine.

Personal Computers on Wall Street

For a successful broker, there's no such thing as a slow day in the stock market. Especially in the not-so-old days when a broker arrived at the office early, tore through the Wall Street Journal, *charted clients' stocks on paper, then buckled down to the hectic business of buying and selling. Under the constraints of such a routine, any broker could count on at least one good opportunity lost.*

To help him stay a step ahead of the game, Cambridge, Massachusetts stockbroker Denys Wortman uses a personal computer to collect financial information. "It cuts an incredible amount of time from my routine," says Wortman. "I get up-to-the-minute price and volume figures from Dow Jones and historical information from Microquote (a computer service that provides information on 32,000 stocks, bonds, and options).

"My business volume has increased dramatically, and I just bought another personal computer for use at home. It comes on at 7:05 each evening, dials up Dow Jones, and updates about 400 stocks I'm tracking. What could be simpler?"

Ben Rosen, a pioneer in the use of the personal computer as an investment tool, started his Wall Street career as a securities analyst specializing in high technology companies. Today, running his own con

sulting and research firm (which publishes the highly-acclaimed Rosen Electronics Letter), *Rosen says "My own personal computers have been invaluable to me; after all, having the most current information at your fingertips can be worth thousands—or even millions—of dollars in one day of active trading.*

"I have such a great need for information processing," Rosen adds, "that I ended up with two computers—one at the office and one at home. All I have to do is carry the software back and forth."

Another investor who depends on the personal computer in his work is Jack Burrows. From his Northern California office, Burrows uses his personal computer and the Dow Jones News/Retrieval Service to make buy-and-sell decisions on a portfolio of about sixty stocks. The program he uses, based on the "On Balance Volume" investment theory, calculates buy-and-sell recommendations on the basis of trading dates, volumes, and closing prices.

"For me, pouring over the figures in the Journal is a thing of the past," says Burrows. "The computer does all the monitoring, giving me more time to think about how I'm going to act."

How to Buy Time

These data base and electronic mail services are available on a subscription basis. To take advantage of them you must have a "modem," a device that links, via telephone, the personal computer to a network (see "Modems," page 41).

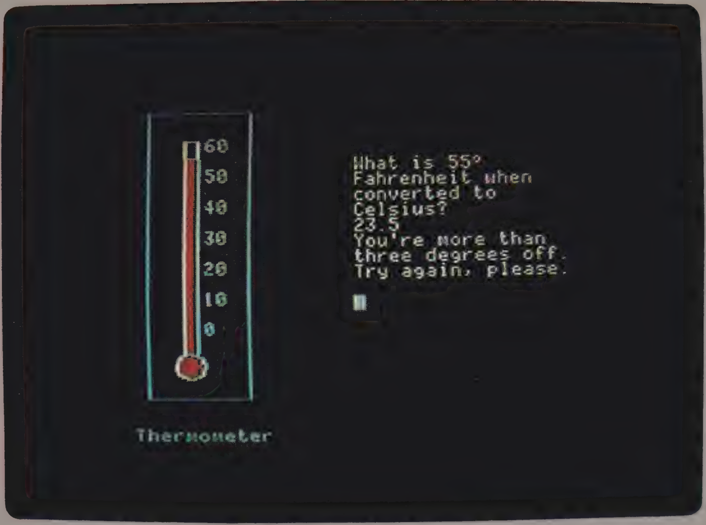
Costs for network services vary. They often include an entry fee ($100 for The Source) and an hourly charge for computer time (plus telephone charges). For electronic mail transmission, there is also a charge based on length and number of messages transmitted. Hourly charges vary considerably—from less than $5 per computer hour for general information services to more than $150 per hour for highly specialized data bases. Some services offer discounts during non business hours. Most are available twenty-four hours a day, seven days a week.

Two guidebooks to these services are published by Tymnet in Cupertino, CA, and Telenet in Vienna, VA. They describe the national and international information services. You also can find out about the various services in the *Information Industry Marketplace 1981* (published by R.R. Bowker Co., New York).

Computers in the Corporate Classroom

Thinking of the personal computer as an educational tool, it's easy to visualize only a schoolroom where the computer serves as a friendly spelling drill instructor and teacher aide. In many companies, however, personal computers are now used for training employees in management, planning, and selling tactics, as well as for developing industrial skills.

There are several reasons. Personal computers have proven to be effective teachers, raising retention rates from 20 to as much as 70 percent. Computer-assisted instruction (CAI) and computer-assisted training (CAT) blend text, sound, graphics, and video technology to present programs. They also encourage more active participation—with the result of increased motivation.



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What is 55°
Fahrenheit when
converted to
Celsius?
23.5
You're more than
three degrees off.
Try again, please.
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In addition, the personal computer offers greater flexibility than is possible with traditional lecture training programs. Employees can arrange their own schedules. Instructors, freed from the mechanics of delivering lectures, can give more time to individualized training. Naturally, these cut the traditional training costs of lecture time and travel expenses. And the materials, so easily duplicated and transported from one site to the next, are inexpensive—another reduction in training costs.

Finally, while CAI and CAT programs aren't intended to replace instructors, they can provide students with praise, encouragement, and other appropriate responses. (In one situation, a personal computer used in one classroom remarked to the student how well he was doing but then asked, "Do you have your book open?" In fact, the student *was* cheating...working from the open text in a learning exercise.)

How Computers Teach

Used in training, the computer either simulates situations that are otherwise too costly, too dangerous, or too time-consuming for employees to work with; or it "lectures" on subjects that address management, financial planning, human relations and other issues. In both instances, learning is interactive—that is, the computer presents information (usually via the monitor) and requires the student to respond to questions through the computer's keyboard. In this way, learning is self paced, and the computer manages student progress—periodically testing for comprehension, then branching into a review or introducing new information as indicated.

Computer courses are often developed by company instructors, but they work with a computer rather than a typewriter, and they create materials by using programs designed for teachers. Even instructors with zero computer experience can sit down with a personal computer and begin to create instructional materials within a few hours.

Custom Applications through Programming

It's no more necessary to learn programming to use a computer than it is necessary to learn your way around the engine of an automobile in order to drive it. But programming can help you tailor solutions to unique problems. Through computer languages like BASIC, Pascal, COBOL, FORTRAN, and PILOT, it is possible to develop new applications, or modify programs that are commercially available.

For example, a utility company manager programmed a personal computer to monitor energy-saving improvements. An oil company manager programmed his personal computer to plot real property acreage to assist in locating industrial sites. A physician developed a program to track and calculate drug dosages. An attorney wrote a program to estimate estate taxes. A designer routinely programs a personal computer to help design parts for manufacturing.

■

Arthur Young's Audit Testing

Among the first businesses to recognize and tap the potential of the personal computer was Arthur Young & Company. One of the "Big Eight" accounting and consulting firms, it also led in the transition to computerized auditing.

Today, Arthur Young's auditors use the personal computer to examine and test client records that are kept on a wide range of mainframe and minicomputer systems. Integrated into a system Arthur Young has developed called **Audit-Computer**™, *the personal computer gives auditors direct and easy access to all the data they need in order to perform analyses—and without any risk to information stored in client files.*

"In the past, we've depended only on outside service centers, or run our audit software directly on the client's system," explains Rick Richardson, Arthur Young's national director of computer auditing. "But the software can't be compatible with every system, and even when it is, the client can't always provide the necessary computer time to run it."

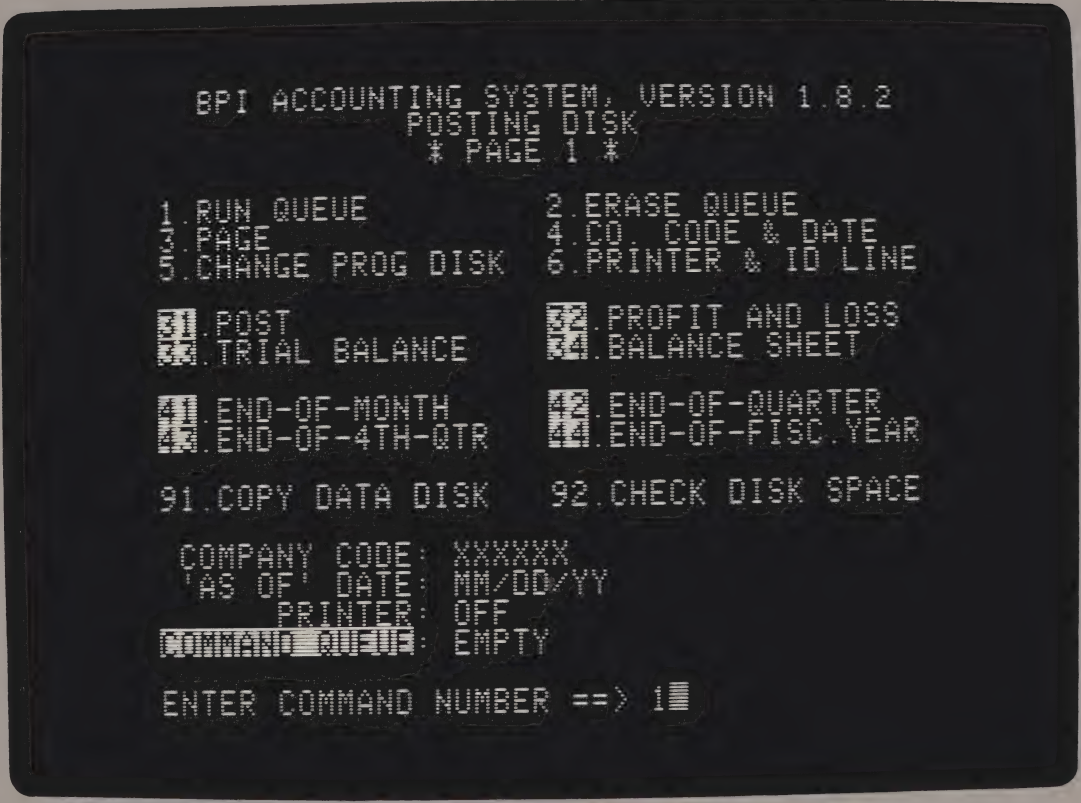
Now, Arthur Young's auditors typically need the help of the client's programming staff only at the beginning of a project, to facilitate the transfer of information from the company's computer to a large storage "hard disk" on the Audit-Computer. At this stage, the size of the data file is also considered.

While the AuditComputer can handle many different data files, if the data requirement is too large, the audit testing is performed directly on the client's computer system.

Once the financial records are loaded onto the hard disk, Arthur Young's auditors use special software to sample, analyze, and review the records.

"Because it's adaptable to a variety of auditing applications," Richardson says, "the AuditComputer gives us a tool that's both flexible and cost effective. We expect it to have a significant impact on audit testing."

Per$onal Computer$ for the $mall Bu$ine$$



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      BPI ACCOUNTING SYSTEM, VERSION 1.8.2
                 POSTING DISK
                  * PAGE 1 *

1.RUN QUEUE             2.ERASE QUEUE
3.PAGE                  4.CO. CODE & DATE
5.CHANGE PROG DISK      6.PRINTER & ID LINE

31.POST                 32.PROFIT AND LOSS
33.TRIAL BALANCE        34.BALANCE SHEET

41.END-OF-MONTH         42.END-OF-QUARTER
43.END-OF-4TH-QTR       44.END-OF-FISC.YEAR

91.COPY DATA DISK       92.CHECK DISK SPACE

  COMPANY CODE: XXXXXX
  'AS OF' DATE: MM/DD/YY
       PRINTER: OFF
 COMMAND QUEUE: EMPTY

ENTER COMMAND NUMBER ==> 1█
```

Jack Bettles runs two businesses that have practically nothing in common. One is an oil and gas exploration consulting firm, the other is a racquetball club. He runs both of them smoothly on one personal computer using small business accounting programs.

Both businesses have benefitted from automated accounting, he says. "The accounts receivable package has really improved our cash flow. Before, we used to pay someone else to do our books, but it would take two or three weeks to get them back. Then it would take us another week just to get the statements out. With the computer, we can print 300 statements and have them in the mail in a few hours. We get paid a lot faster, too."

Bettles' experience—and the experience of hundreds of others—only begins to illustrate the value of personal computers to small business. With a personal computer and the commercially available accounting programs written for it, it's possible for small business owners to greatly reduce the time it takes to manually handle the meat and potatoes operations of a business: general ledger (G/L), accounts receivable (A/R), accounts payable (A/P), inventory, and payroll.

Automated accounting systems also significantly improve the accuracy of record keeping, and eliminate money spent on outside accounting or timesharing services. Most important, though, they allow for better control of company finances, improve cash flow management, and increase the potential for greater short-term and long-term profits.

Commercially available small business accounting programs were among the first programs to enter the market after the debut of personal computers. Now in use for several years, many have proven themselves extremely reliable and easy for the novice to use. Most programs, for instance, are structured around a list of program functions, called a "menu"—like the one above. It lets the user choose among the many functions the program will do. Most small business accounting programs also are reasonably priced and adaptable to any size small business.

Between bottom-line cash flow improvements and the time saved on paperwork, you can probably justify the cost of a personal computer on the basis of a single accounting operation alone. There are many programs, however, unrelated to accounting, that you can use to streamline other small business operations. Word processing, data base management, and telecommunications are some of the obvious choices. Another program, financial modeling and forecasting ("electronic worksheets"), puts into your own hands the same kind of management tool that larger companies have used for years.

Automating the General Ledger (G/L)

Nothing so clearly gauges a company's financial condition as the general ledger. As the foundation for profit and loss statements and balance sheets, the G/L serves as scorekeeper for a company's every transaction involving cash and non-cash receipts and expenses.

Computerizing the G/L, you'll find it much easier to maintain your chart of accounts and general journal, and to produce standard profit and loss statements and balance sheets. In addition, many G/L programs generate valuable analytical reports—actual-to-budget, prior year comparisons, and comparative balance sheets—that couldn't be expected from manual accounting systems. With these reports, you're in a better position to observe trends, and weed out problems that cut into profits, before those problems take root.

Features to Look For

Almost all G/L programs designed for personal computers offer the same basic features. Nevertheless, descriptive terms vary considerably. One program's "P&L statement," for example, is another program's "operating statement." A "journal file" for one is a "transaction file" for another. And so on.

Commonly, however, any G/L program will:

- keep a master chart of accounts (with user definable account numbers) that maintains basic information about each;
- maintain a general ledger that records and summarizes financial information for each account;
- print financial reports and summaries;
- generate audit trails through transaction listings.

When you examine various programs, consider the types of reports and report structures they offer. Almost all G/L programs, for instance, now include a "financial statement formatter" that allow you to set your own specifications for reports such as P&L statements and balance sheets. This way, you can print reports that conform to your existing formats.

With many programs, you also can print out master charts of accounts as well as transaction listings, general ledger, cash-receipts and cash-disbursements journals, and consolidation summaries. Some even provide amortization and depreciation schedules. (Most reports are based on 12-month and year-to-date reporting periods, though some make room for 12 previous months as well.)

Typically, G/L programs are built around easy-to-follow menus. Many also are designed to accept information from other departments and compatible accounting programs: usually billing, accounts receivable, accounts payable, inventory, payroll, and job costing.

Programs vary in terms of their account capacity, operating method, and types of reports that can be generated. For example, some programs are tailored to businesses with 150 or fewer accounts and a few hundred transactions monthly; others, designed for larger small businesses, can accommodate multiple companies with several thousand transactions annually.

Accounts Receivable (A/R): Which Way Does Your Cash Flow?

As illustrated by the cartoon showing a man leaping from a burning building while clutching his accounts receivable journal, A/R is the heart of every business—the basic record of everything it receives and everything it is owed. Managed effectively, A/R allows a healthy cash flow into the company coffer.

A computerized accounts receivable system essentially does the same things a manual system does—maintains customer files and keeps a history of each account—but with greater accuracy and in a fraction of the time required to prepare them by hand. Ultimately, an A/R program can significantly improve customer service with prompt and accurate monthly statements. It also can improve cash flow through reduced turnaround time on collections.

Features to Look For

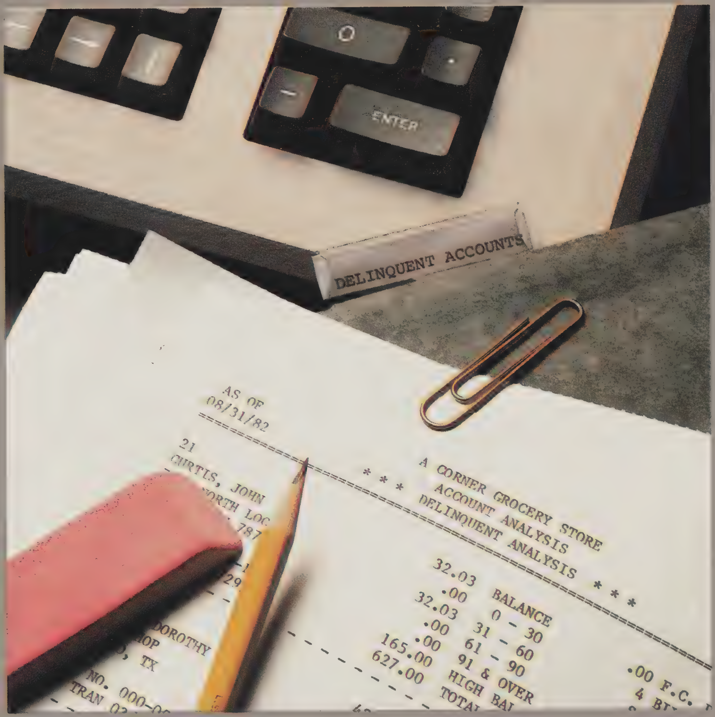
Besides maintaining customer files and accounts, A/R programs can:

- generate accurate monthly customer statements (on either ordinary paper or preprinted forms);
- automatically post receipts to each account and to the general ledger;
- automatically "age" accounts into 30, 60, 90, and 120-day time periods;
- calculate and post service charges on past due accounts;
- provide up-to-date information on account activity and status.

You can expect all A/R programs to offer these basic services, usually through the use of menus that list program options. Differences, though subtle and varied, lie primarily in the number of customers that can be accommodated, accounting methods used, and types of reports offered. For example, some programs can handle only several hundred customer records on each 5 1/4-inch floppy disk of storage (see page 39). Others can support up to 1,200 customer records on each disk, or several thousand on each hard disk. Some programs are structured around a simple balance forward method of accounting; others are structured around an open item accounting method. (Several programs give you a choice.)

You'll also find that most programs feed into the general ledger, though only a few post each A/R transaction on a daily basis.

The types of reports vary as well. Some programs offer only the bare-bones customer lists, trial balances, cash receipts journal, and daily transactions. Others generate as many as 20 additional reports, including sales analyses by customer, region, salesperson, and customer category; general ledger posting report; debit and credit entry lists; and twelve-month sales histories.



Found: Jack of All Trades for Exports and Records

Running his export company in San Diego, California, and a retail record store in nearby La Jolla, Luis Carrillo uses three personal computers. ''It's the best investment I've ever made, and I've been in business for twenty-five years,'' says Carrillo, who is making plans to put five more personal computers into his executives' offices. ''We use the Apple in our main office 90 percent of the time every day—when not for accounting, for VisiCalc, word processing, or direct mail. There are so many applications, it's really up to your imagination.

''In our export company, customers call from Mexico, Brazil, Argentina. They ask 'How much will this cost or that cost?' From records in the computer, we can tell them right away—also how reliable the manufacturer is and when they can realistically expect shipment.''

In his record shop, Carrillo's managers are building a computerized file of record distributors so they can handle special orders more rapidly.'' We get a lot of special orders,'' Carrillo explains. ''Keeping track of distributors who specialize in rare recordings helps my staff respond to customers more rapidly.''

It was his need for greater control over finances, however, that led Carrillo to consider a personal computer. ''Two years ago I just didn't have the information ***available*** *in time to really control things. I would get aging of our accounts receivable around May 20 for April—that's way too late if you want to collect on time. Now I get the aging report on the fifth of every month. We can see right away who's behind; then we get on the telephone.*

''We did a study once, with VisiCalc, to see how long it took to collect before we had a computer. It was amazing. We found that, with the computer, we'd cut collection time way down—in dollars, we saved about $250,000.''

Accounts Payable (A/P)

Few small businesses see accounts payable (A/P) as a source of profits—quite the opposite, in fact. With computer-based accounts payable systems, though, you can actually make money by planning payments to capitalize on short-term investments. You can also save money when you plan payments to take advantage of vendor discounts and reduce short-term borrowing.

Features to Look For

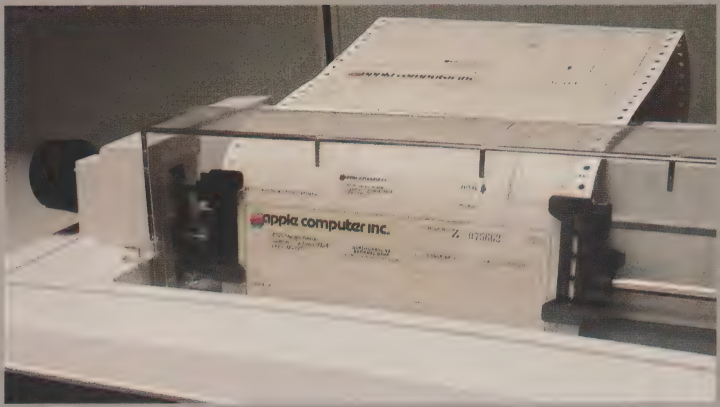
Integrated into the general ledger, and menu-driven like other accounting programs, A/P programs typically:

- give you a choice of different payment methods (all outstanding invoices, pay by due date, partial payments, selected invoices);
- provide audit trails;
- flag and/or automatically pay invoices that offer discounts;
- automatically generate checks and mailing labels or envelopes;
- generate A/P aging reports by invoice.

Like general ledger and accounts payable programs, A/P programs differ in the range of reports they offer. But you can expect to find in better programs monthly and/or year-to-date transaction summaries, master vendor lists (alphabetically or by number), cash requirements projections, trial balances, G/L distribution reports, and check registers.

Inventory Control: How to Earn More With Less

Situation: Hypothetical Acme Widget Company has just received a call from a customer looking for brass widgets. While the Acme clerk sifts through a wall of index cards or physically examines the store's brass widget inventory, the customer calls four other distributors. At ABC Widget, a clerk punches a couple of keys on the computer and, within seconds, tells the customer that ABC carries plenty of brass widgets. Question: Which store makes the sale?



Perhaps this is an oversimplification, but it illustrates a classic problem in inventory control: under manually-operated systems, most small business owners have no way to keep track of everything in stock.

Inventory control, though one of the most complex tasks for a personal computer to perform, can help you significantly improve control of stock levels, cash flow, and—most important—customer service. With the computer, for example, you can find out instantly if an item is stocked or on order. You can readily identify and weed out slow-moving and obsolete products and thus reduce your carrying costs. Also, you can find out sooner that profitable stock needs to be reordered, so it will always be available, thus improving customer service and reducing lost sales.

One reason for the complexities of inventory management is the nature of small business. Requirements vary so widely that it is difficult to find a program with universal appeal. The program that suits a small retailer who simply buys and sells products is probably inadequate for the manufacturer who uses bills of materials and job costing. Nor will it work for the auto parts distributor who stocks a huge inventory, or the appliance store owner who keeps track of warranties by product, model, or serial number.

Still, with an increase in flexible programs designed for personal computers—and improvements in technology that now make room for larger, more complex inventories—computerized inventory offers significant gains in small business profitability.

Features to Look For

The better inventory programs let you:

- maintain a master record of each item in stock (including product number, name or description, quantity on hand, unit cost, unit price, retail price, and total cost);
- identify stock by unit, weight, volume, or liquid or dry measure;
- work with several costing methods, such as LIFO (last in, first out), FIFO (first in, first out), and averaging;
- call up any item on record to find out quantity in stock, on order, or on back order;
- delete or update any item on record;
- automatically record sales, receipts, and adjustments (such as returns, shrinkage, or overages) and transfer information to the G/L and A/R;
- tag products with several prices (normal retail, discount, and bulk order, for example);
- identify reorder levels, which the computer can watch for and flag (even calculate and suggest reorder quantities based on sales);
- learn, within a few seconds, the total value of your inventory by product and/or department;
- sort, search, and arrange information into summaries and reports by merchandising category, department, location, vendor, or periods (commonly month-to-date and year-to-date).

Most inventory control programs allow for printed, customized master lists, sales and activity summaries, profit margin reports, reorder and backordered items reports, and department activity summaries. With some programs, you also can print purchase orders and price labels for products.

Of particular interest to many small business owners, though, will be the inventory worksheets the computer generates. Organized by location and/or bin number, these worksheets are particularly helpful for reconciling computer records with an actual physical count.

For example, when ABC Widget takes its annual physical inventory, the computer prints out a master record with a list of various widgets in stock, numbers on hand, and their location. Clerks then simply count and compare their results with the report results; discrepancies are quickly corrected.

Payroll

You can use a personal computer to handle your payroll—a task generally agreed to be time consuming and repetitious. Working with a payroll program, your personal computer can:

- automatically calculate deductions for federal and state taxes, insurance, and other benefits;
- print payroll checks and stubs;
- automatically post information to the general ledger;
- complete preprinted W-2 forms and quarterly tax reports;
- print mailing labels.

In the Wings: Electronic Letters, Words, and Worksheets

As you explore the potential of the personal computer, you'll find dozens of other uses for it beyond small business accounting. Very likely, you'll first lean toward the programs managers and professionals use most frequently: word processing, mailing list and data base management, financial modeling, and telecommunications.

Word processing, for example, allows you to generate and update price lists, contracts, memos, letters, and proposals with extraordinary speed and accuracy (see page 19). Mailing list/data base management programs help you keep better records of customers and clients (see page 17). With your computer hooked to a modem, you'll be able to take advantage of electronic mail services and tap information in computerized libraries all over the world (see page 20).

Outside of accounting, however, perhaps the most valuable tool available to you through the personal computer is an electronic worksheet, otherwise known as a financial modeling and forecasting program (see page 13). Electronic worksheet/financial modeling programs duplicate the same techniques large corporations depend on for strategic planning. They allow you to examine the "what-ifs" of your business: What if we beef up our widget inventory, and sales increase six percent? What if we beef up the widgets, and operating costs go up? ■

The Computerization of Farmer Brown

When Eddie Neiman read about a service that supplied personal computer users with valuable agricultural information, he wasted no time in getting his personal computer hooked into the network. "I bought the computer primarily to help out with crop analysis and budgeting," Neiman says, "but since I plugged into AGNET™ (AGricultural Computer NETwork), the computer has been working overtime."

Neiman and his brother manage a 3,000-acre grain farm outside Paoli, Colorado, about 170 miles northeast of Denver. "Running a farm the size of ours takes a lot of planning," Neiman points out. "You don't just throw seeds on the ground and wait for the crop to come in. AGNET gives us concrete facts and figures we can work with to operate this place more efficiently."

The Neiman brothers use the network to help determine which crops grow best in the various soils on their farm. They also consult the market trend analysis service for updated market reports and comments by specialists. And before buying new machinery, they survey their options using the equipment analysis package.

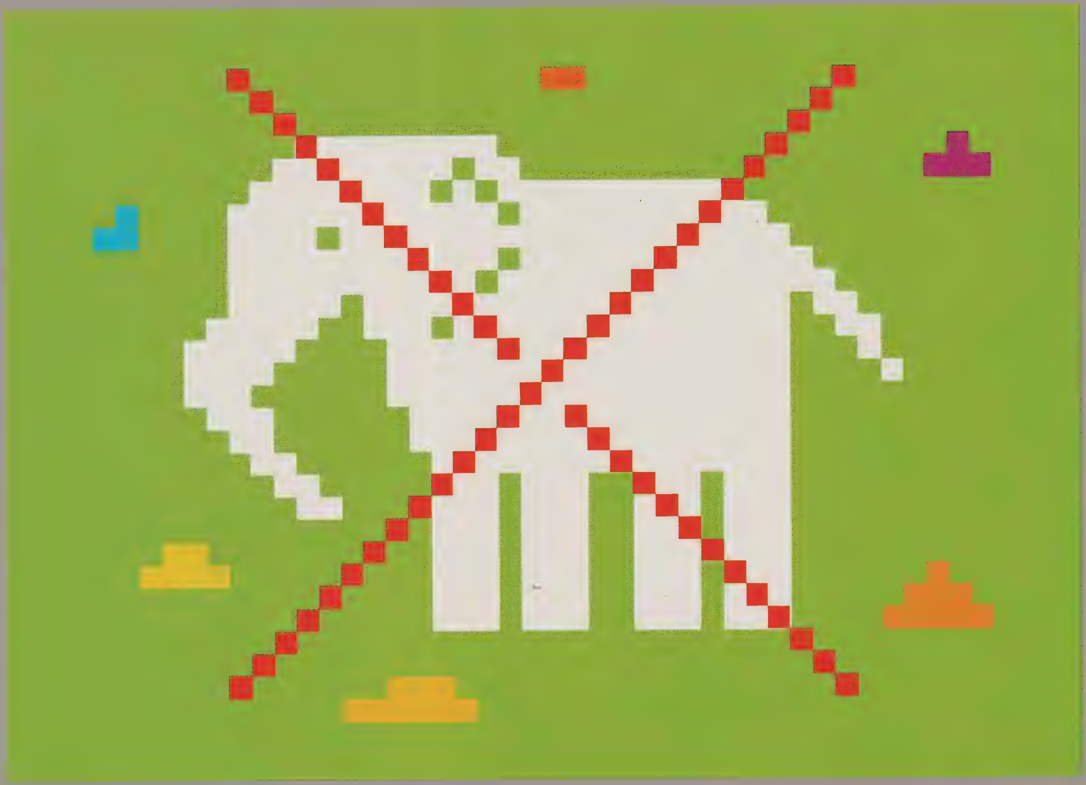
Neil Pullen of Sac City, Iowa, is another whose business has improved through personal computers. He had subscribed to a commercial, computerized bookkeeping service until he realized that one year's service payments would pay for a personal computer—and that bookkeeping was just the beginning of what the personal computer could do. So he began using computers in his seed dealership for inventory, accounts payable, and accounts receivable.

Now, in addition to accounting and word processing software, Pullen has an inexpensive data base management program which allows him to keep comprehensive records on each of his seed fields. Each fall, new files are started with information on fertilizer, insecticide, and herbicide bids. As spring approaches, daily temperatures are recorded to determine when each field is ready for planting. Information is also kept on the variety of seed sown, and the application dates of pest and weed control chemicals.

The summer months find Pullen's computer correlating each crop's calendar age with daily temperature data to pinpoint the proper harvesting time. The selling price of the seed is entered into the data base so that each field's productivity can be calculated.

The computer's usefulness doesn't end there, however. By adding the results of soil analysis tests to his information, Pullen can see how different varieties of seeds perform in various soils. Then he can choose the optimum seed for the next planting in each field, or improve the soil for a particular type of seed.

How to Buy a Personal Computer



Anyone in earshot of a discussion on computers has heard the horror stories. About the manager who poured buckets of dollars into computer consulting, a computer, and custom programming...for a system that to this day doesn't do its job.

Or the independent retailer who got a "really great deal" from the friend of a friend of a brother-in-law...and a slightly used computer with a terrific payroll program. Unfortunately, with only two employees, the retailer didn't need a terrific payroll program. The programs he did need, though, weren't available for the computer he had. Really great deal? For the seller, yes.

You can avoid these electronic white elephants simply by approaching the selection of a personal computer realistically. First, keep in mind that the computer is a *tool* you use rather than an end in itself. Second, the personal computer is a *system*—a combination of software, hardware, and peripherals. Properly arranged, these components help you solve various business problems. Third, a computer system is likely to be the most sophisticated piece of office equipment you will ever buy, so you're wise to evaluate each component under the hard light of objectivity, just as you would any other business investment.

If all you want in a personal computer is word processing, then your task in choosing a computer system is a fairly simple one. You first need to identify which tasks you want a word processing system to handle. Perhaps you want to be able to underline words, or use italics or bold face type. Then compare the various systems to find the one that comes closest to your specifications. The more tasks you want the computer to handle, the more complex the selection process becomes.

The key to successful office automation is in the groundwork. Getting the computer in hand is merely the last step in a process that begins with careful planning. Identifying your needs is the first, and usually most complicated, step.

The more you know about your own needs, the easier it will be for you to evaluate the software, hardware, peripherals, and support that successfully bring computer power to your work.

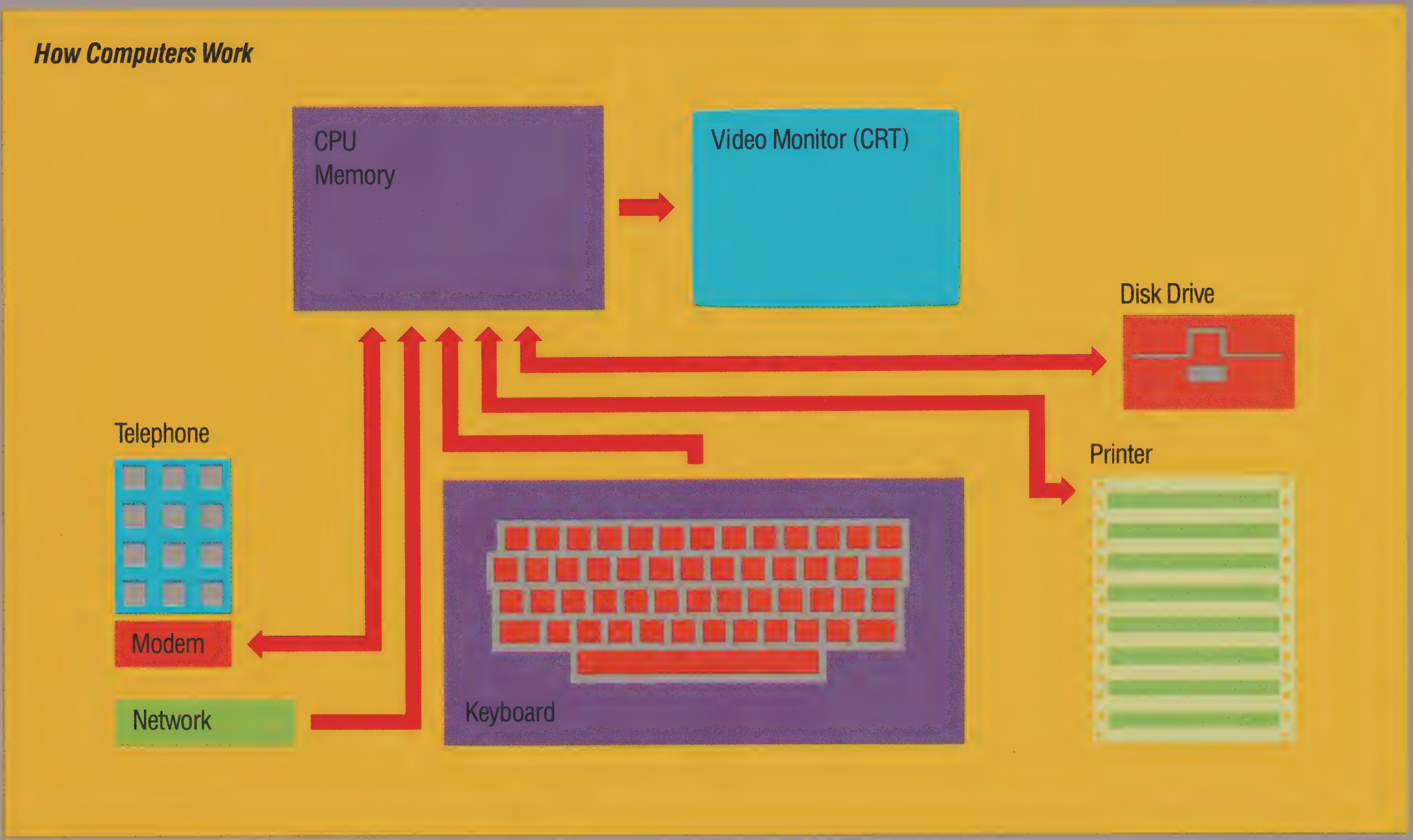
Ten Commandments of Computer Planning

The most important rule to keep in mind when you look at any computer system is your own needs. Buying backwards—that is, buying the computer first, then looking for programs it can use—is like catching the wrong train. It may be a good machine, but it's probably not going to get you where you want to go. *First, find the software that will do the job you want; then find the equipment that will put it to work.*

Start with the following strategies:

1. *Allow plenty of time to learn about, decide on, and implement a personal computer system.* It's true that advancements in technology have produced computers that are relatively easy for the novice to use. Nonetheless, you must expect to put in some degree of effort to become acquainted with the enormous range of computer programs, hardware, and peripherals designed for personal computer users.

2. *If you work in a large company, take advantage of the computer expertise in your company's data processing department.* Managers of data processing and management information systems can lend excellent advice and direction to the computer selection process.



With a personal computer, you typically use the keyboard to enter commands or information. Then the central processing unit (CPU) goes to work. Following your instructions, and using memory as its work area, the CPU collects and stores information on disks inserted in the disk drives. It also sends information to the monitor for display, performs calculations, sends material to the printer for printing, and transmits and collects information to and from other computers by means of a telephone and modem.

In some companies, they may provide additional support through personal computer training courses that shorten the learning curve. Also, when a company makes multiple purchases, the data processing managers can help assure a level of standardization that allows personal computers to exchange information with each other and with larger computers inside and outside the company.

3. *Start small and stay basic.* At first, automate only the areas of your work or business that you understand best. Later on, when you have successfully converted one area to automation, add other applications. (It's also a good idea to start with a noncritical task; that way, you don't need to have the system functioning perfectly the first day in order to stay in business.)

4. *Provide realistic budgets that consider hidden costs.* Include everything you think might be necessary to the system you purchase. This means software, including possible program modifications; hardware, including peripheral equipment, storage disks, and other initial supplies; maintenance contracts; costs, if any, for installation, training, insurance, and furniture; and, if you retain a consultant, consulting fees.

5. *Buy only from major suppliers with sound reputations and solid track records.* They can provide you with reliable support both before and after the sale. And because this support is as much a part of the computer system as the hardware, don't hesitate to ask for, and check, references.

6. *Look for a computer that can grow with your business.* The computer system you choose should be able to accommodate additional transactions and tasks you require as your own productivity increases over the next three to five years.

7. *If you retain a professional consultant, choose carefully.* Computer consulting fees are often high compared to the modest price you'll pay for a personal computer system. If you do decide to work with a consultant, choose one who has a clear understanding of your business needs.

8. *Maintain realistic expectations.* Keep in mind that the computer is a *tool* used to solve problems. It won't make decisions for you or eliminate your staff. Neither is the computer a cure-all for a badly managed department or business; it will only automate your problems. In fact, the best candidates for computerizing are those departments, offices, and businesses that are functioning under well-structured—if time-consuming—manual systems, because they most easily convert to automation. If your office or business leans more toward chaos than controlled growth, you'd be wise to upgrade your manual procedures before you apply computer power to them.

9. *Take advantage of the wealth of information on personal computers available through computer magazines, trade shows, seminars, and professional publications* that are beginning to regularly address the issue of personal computers in business (see "Sources of Information," page 44).

10. *Plan for a transition period if you are automating an accounting system.* When you do implement a personal computer system, run the new, automated procedures alongside manual procedures until you gain confidence with automated operations.

Creating a Plan

You won't need to share your office with a team of systems analysts and programmers just to put a personal computer to work. That may have been the case ten years ago, but today you can do the planning yourself by accurately identifying your needs before you compare, and decide among, personal computer systems. (In fact, planning actually accounts for 80 percent of the work in choosing a personal computer.)

Then, once you've clearly targeted your needs, computer sales representatives can help identify and tailor systems to meet them.

Define the Job

To begin, pinpoint the applications that would benefit from computer control—usually cumbersome manual systems that function smoothly, if sluggishly.

If you're losing valuable management time because of an overload of paperwork, for example, look at your procedures for developing sales forecasts or other financial models, and the procedures you use to get out reports. Do you spend a lot of time working with spread sheets? Maybe it's the paperwork—preparing each spread sheet, calculating, and recalculating. Or perhaps it's because information you need trickles in randomly from other departments or divisions. You may also find you're locked in with reports and correspondence that require repetitious review, revision, and retyping—another bottleneck the computer can relieve.

Accounting may be the area you will want to automate first if you run a small business. If so, identify each accounting task you want the computer to handle, such as the general ledger, accounts receivable, inventory control, and others. Identify as well the peripheral functions you may eventually want to automate, such as mail list management or word processing.

After you have identified the jobs you want the computer to handle, write down, in order of importance, which ones you think will benefit most from automation. At the same time, consider which ones will give you the greatest profit leverage. If it's cost management of raw materials—for which the prices fluctuate widely on the wholesale market—then consider automating cost data, inventory, and forecasts to take advantage of favorable market conditions.

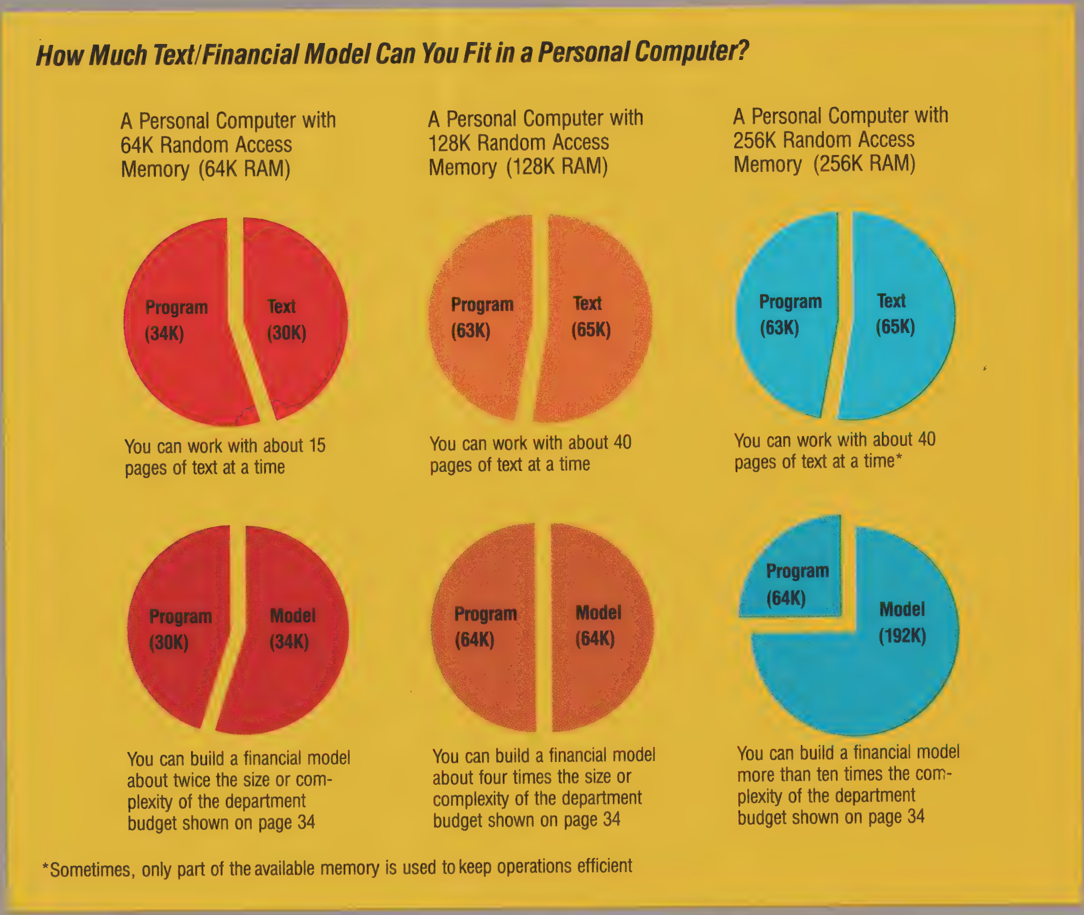
Describe the Job

Next, prepare a job description for the computer. For complex applications, this is the most time-consuming part of planning—and the biggest stumbling block for the first-time buyer. Your efforts, however, will pay off handsomely in a computer that does precisely what you expect of it. A job description or specification—whether it constitutes two pages describing a single application, or twenty pages describing a series of applications—will indicate how much computer you'll need for the information you work with, and what kind of software you'll need to handle the work.

Example 1: Word Processing

The simplest computer job description you'll prepare is for word processing. Start by collecting examples of your correspondence and reports. They will be your guide to the type of word processing program, amount of computer memory, and type of printing mechanism you'll need.

The *appearance* your correspondence and reports should take will determine the type of word processing program and printer you choose. If you underline words or phrases in your reports, for example, you'll want to find a word processing program capable of underlining. If you work with subscripts or superscripts, they, too, should be considered when you look at different word processing programs.



How Much Text/Financial Model Can You Fit in a Personal Computer?

A Personal Computer with 64K Random Access Memory (64K RAM)

You can work with about 15 pages of text at a time

You can build a financial model about twice the size or complexity of the department budget shown on page 34

A Personal Computer with 128K Random Access Memory (128K RAM)

You can work with about 40 pages of text at a time

You can build a financial model about four times the size or complexity of the department budget shown on page 34

A Personal Computer with 256K Random Access Memory (256K RAM)

You can work with about 40 pages of text at a time*

You can build a financial model more than ten times the complexity of the department budget shown on page 34

*Sometimes, only part of the available memory is used to keep operations efficient

Computer programs vary in the amount of Random Access Memory (RAM) they need in order to operate. For general comparison, though, we've used a popular word processing program and a financial modeling program to show you how much "work space" or RAM you have in personal computers after programs are loaded. Permanent storage, of course, is another issue; using disks, you can store unlimited documents and financial models.

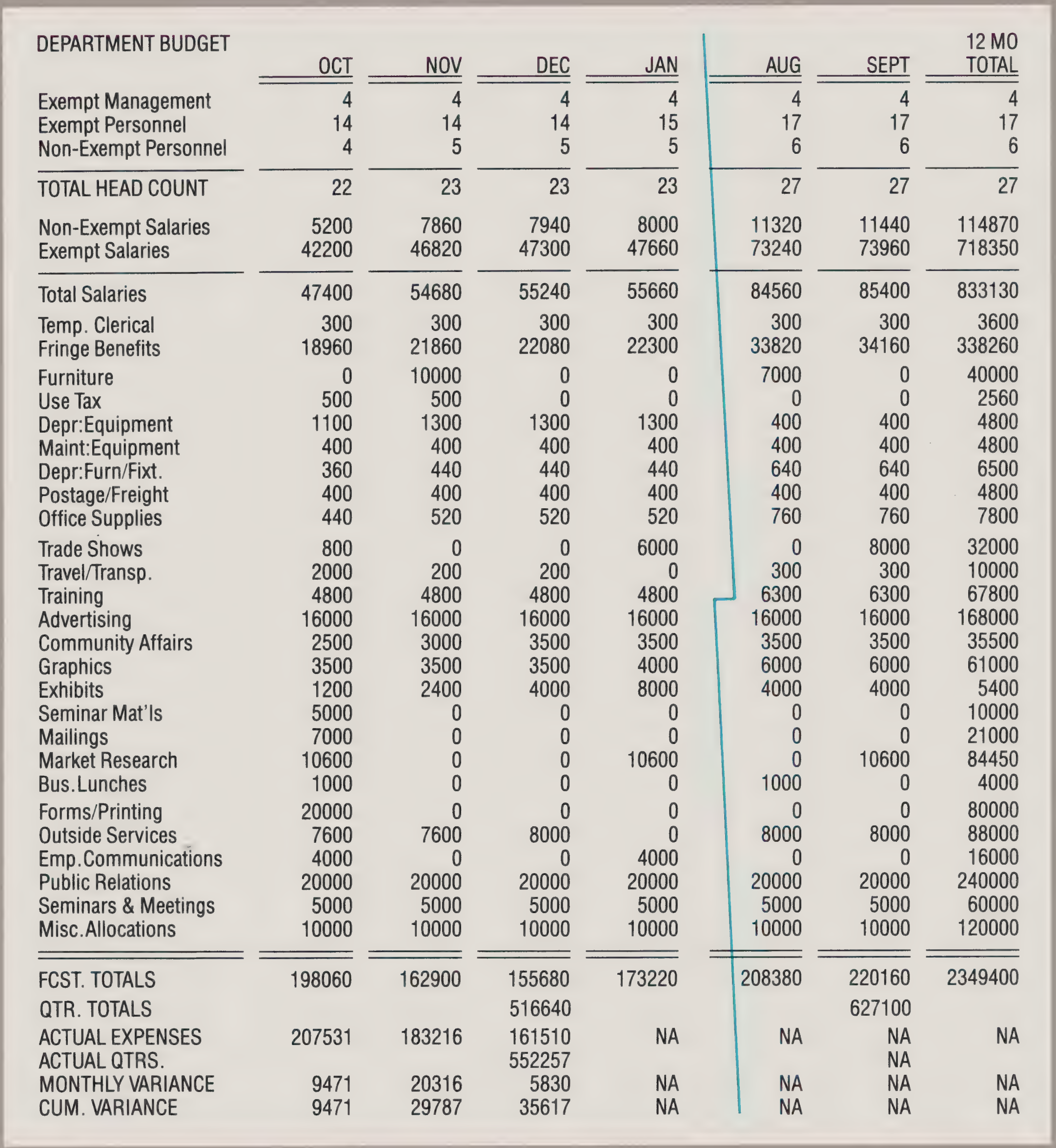
The *length* of the documents you produce will have something to say about the amount of computer memory you'll need. (By computer memory, we mean computer "desk space"—the amount of room you have inside the computer to do the work. Some memory is needed by the instructions or program that operate the computer equipment; what's left over is the room you have to work with. See the illustration on page 33.)

For instance, if you generate ten-page, single-spaced reports every week, you'll want to look for a computer with enough (48K) memory to hold at least ten pages of text at once, besides the instructions that operate the program and equipment. (A personal computer with "128K" of memory normally can hold at least forty double-spaced pages of text at a time, as well as the operating system and program instructions. It can also permanently store your forty page documents on floppy or hard disks.)

The *type* of text you normally generate will also influence the type of printer you hook up to the computer. If you regularly send out memos or letters on company letterhead, for example, you'll need to look for a printer that will produce letter-quality text on single sheets of paper. If, instead, you generate lengthy reports for internal use, you may want a printer that can print at high speeds on continuous sheets.

Word processing programs offer other features you may need—a spelling checker, for instance, if you are a bad speller or poor typist; or a way to link parts of different documents if you build reports that way; or a facility to reproduce form letters if you frequently make use of them.

Once you've collected samples of your correspondence and reports, make a list of the most important elements you need in a word processing program.



DEPARTMENT BUDGET	OCT	NOV	DEC	JAN	AUG	SEPT	12 MO TOTAL
Exempt Management	4	4	4	4	4	4	4
Exempt Personnel	14	14	14	15	17	17	17
Non-Exempt Personnel	4	5	5	5	6	6	6
TOTAL HEAD COUNT	22	23	23	23	27	27	27
Non-Exempt Salaries	5200	7860	7940	8000	11320	11440	114870
Exempt Salaries	42200	46820	47300	47660	73240	73960	718350
Total Salaries	47400	54680	55240	55660	84560	85400	833130
Temp. Clerical	300	300	300	300	300	300	3600
Fringe Benefits	18960	21860	22080	22300	33820	34160	338260
Furniture	0	10000	0	0	7000	0	40000
Use Tax	500	500	0	0	0	0	2560
Depr:Equipment	1100	1300	1300	1300	400	400	4800
Maint:Equipment	400	400	400	400	400	400	4800
Depr:Furn/Fixt.	360	440	440	440	640	640	6500
Postage/Freight	400	400	400	400	400	400	4800
Office Supplies	440	520	520	520	760	760	7800
Trade Shows	800	0	0	6000	0	8000	32000
Travel/Transp.	2000	200	200	0	300	300	10000
Training	4800	4800	4800	4800	6300	6300	67800
Advertising	16000	16000	16000	16000	16000	16000	168000
Community Affairs	2500	3000	3500	3500	3500	3500	35500
Graphics	3500	3500	3500	4000	6000	6000	61000
Exhibits	1200	2400	4000	8000	4000	4000	5400
Seminar Mat'ls	5000	0	0	0	0	0	10000
Mailings	7000	0	0	0	0	0	21000
Market Research	10600	0	0	10600	0	10600	84450
Bus.Lunches	1000	0	0	0	1000	0	4000
Forms/Printing	20000	0	0	0	0	0	80000
Outside Services	7600	7600	8000	0	8000	8000	88000
Emp.Communications	4000	0	0	4000	0	0	16000
Public Relations	20000	20000	20000	20000	20000	20000	240000
Seminars & Meetings	5000	5000	5000	5000	5000	5000	60000
Misc.Allocations	10000	10000	10000	10000	10000	10000	120000
FCST. TOTALS	198060	162900	155680	173220	208380	220160	2349400
QTR. TOTALS			516640			627100	
ACTUAL EXPENSES	207531	183216	161510	NA	NA	NA	NA
ACTUAL QTRS.			552257			NA	
MONTHLY VARIANCE	9471	20316	5830	NA	NA	NA	NA
CUM. VARIANCE	9471	29787	35617	NA	NA	NA	NA

This department budget uses or fills up about "20K" of computer memory—nearly all the available capacity of a 48K computer loaded with the financial modeling program used to create the budget.

Example 2: Financial Modeling/ Forecasting

Collect samples of all your financial models and forecasts, and make a note of their size, the calculation rules you used to produce each model, and how the models were used (do you use models in presentations, as a personal decision support tool, or both?).

Model size, calculation rules, and model functions provide the framework for system specification. Model size and requirements will help determine the memory size and computer program you'll need. (With some financial modeling programs, regardless of the computer's memory capacity, you can create models only of a limited size.) Since different programs offer built-in calculation rules, the rules you need will help determine the program. Model function will determine the nature of the printing mechanism, if one is necessary.

The department budget illustrated above fills up about "20K" of memory, nearly all the available capacity of a computer with "48K" of memory, after it already holds the program itself. If you want to build more complex models, or consolidate models, you'll need a computer with considerably larger memory or a computer program that stores information on the disk until it's needed. Such programs can handle much larger models, and offer great flexibility, but at the cost of slower operation.

Example 3: Mail List/Data Base Management

When you're planning for computer management of mailing lists, client or customer files, patient records, and other information data bases, there are several things to consider.

One is the computer's *permanent storage capacity;* it determines how many records you can keep on permanent file. This storage is typically provided on floppy or hard disks (see "Disk Storage," page 39). Besides the number of records you want to store, you also must decide how you want to organize them. By name, address, telephone number, title, zip code? And how do you want to use the information? How do you want to retrieve records? By name, address, description, subject?

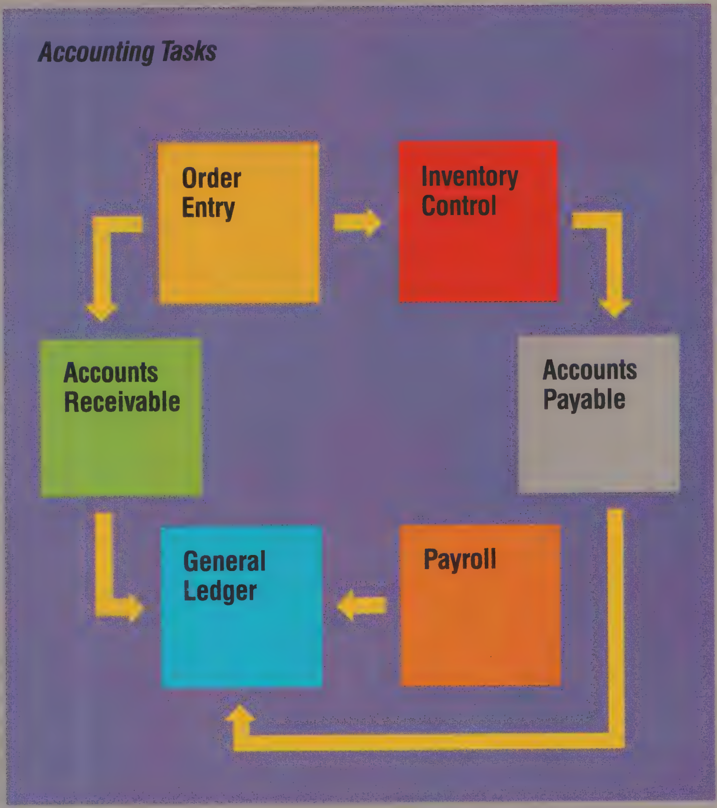
To find out how much storage space you'll need, the procedure is really quite simple. Say you wanted to computerize an address list for 100 clients that you currently keep on 100 three-by-five cards. Each card might include the client's name, title, company name, address, telephone number, and perhaps a few words that identify the nature of the account:

How many typewriter keystrokes are required to get this information on a three-by-five card? In this case, including the spaces between words and six carriage returns: 182 keystrokes. To find out how much permanent storage you would need in a computer, multiply the *maximum* number of keystrokes you would use for one card by the total number of cards (in this case, 100) in your file.

In our example, you would need disk storage space for at least 18,200 characters (or "bytes")—and more, if you plan to add new names to your file. (A single floppy disk stores anywhere from 80,000 to as many as one million characters.)

The example, though something of an exaggeration, holds true for records of greater complexity as well. Determine the *maximum* number of keystrokes required to type whatever record you want the computer to keep. Then multiply that figure by the number of records you'll need to store (now as well as a few years down the road).

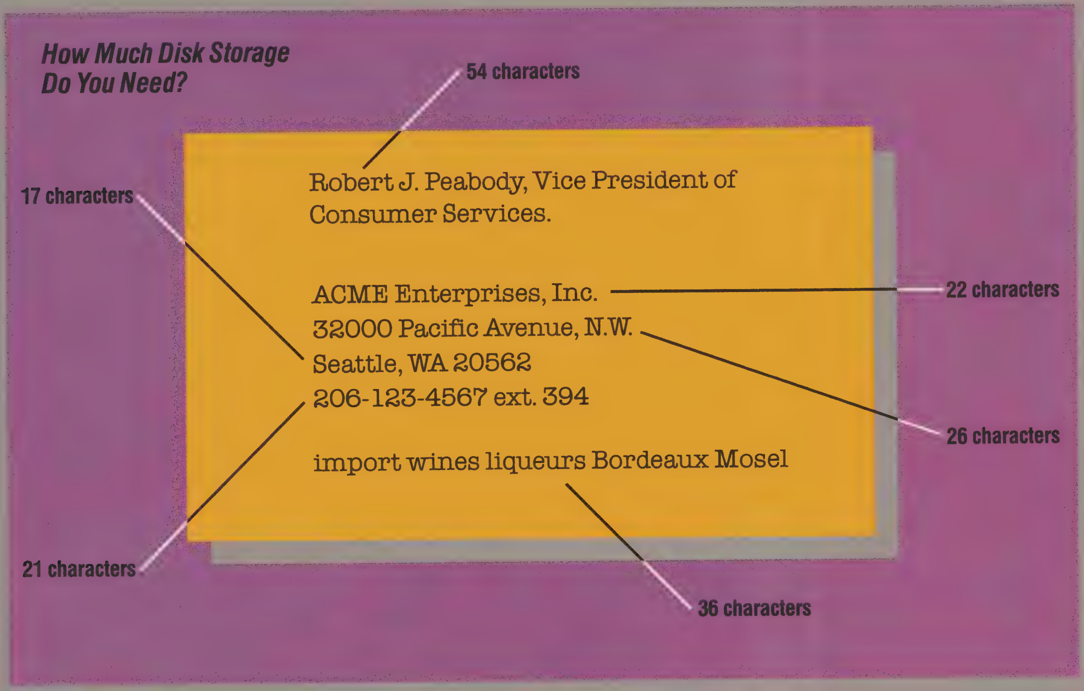
Your computer sales representative can help you determine exactly how much disk storage capacity you'll need for different data bases, but you should take the time to identify the types of information you want to include in a data base, and how many records you want to store.



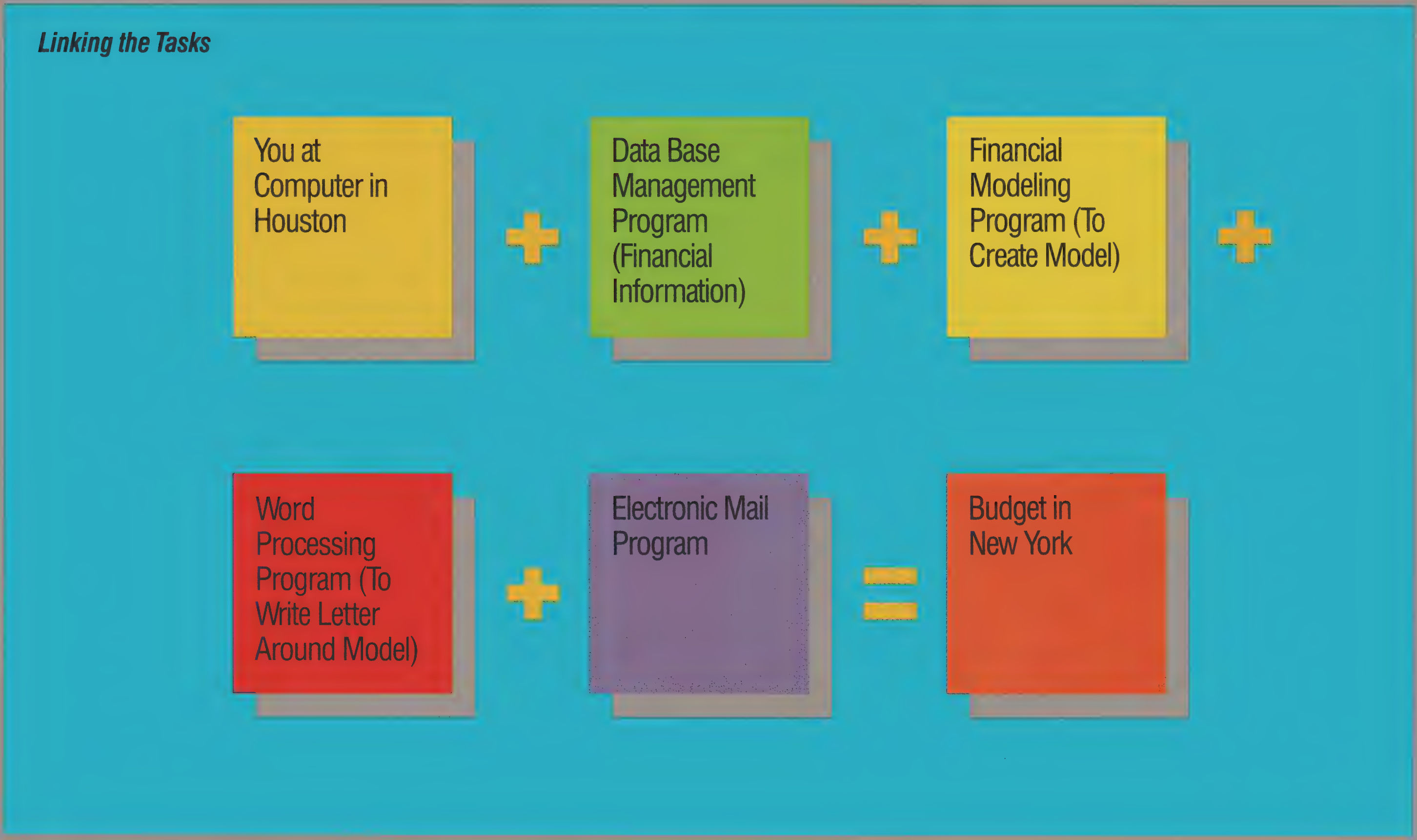
Example 4: Accounting

Identifying your needs for a computerized accounting system is a tricky process because five commonly used tasks—accounts receivable, accounts payable, general ledger, payroll, and billing/inventory control—are interdependent. That means that the computer system must be designed to coordinate all the activities in such a way that you avoid duplication of effort.

A computer dealer who specializes in computer accounting systems is your best source of advice when you plan to automate your accounting procedures. Still, you should have a clear idea of the types of information you want to enter, store, and generate with the computer.



To determine how much permanent storage space you need in a computer, you count and multiply. Count the number of keystrokes (including spaces and carriage returns) required to enter information on, say, this three-by-five card; then multiply by the number of cards you want to keep on file.


Linking the Tasks
You at Computer in Houston
+
Data Base Management Program (Financial Information)
+
Financial Modeling Program (To Create Model)
+
Word Processing Program (To Write Letter Around Model)
+
Electronic Mail Program
=
Budget in New York

If you wanted to use the personal computer to develop a budget and send it with a cover letter to the New York office from your branch office in Houston, you would probably use these four programs.

Begin with a skeletal summary of each task you use in your own accounting system. Identify each task, then list for each:

- the types of information you want to enter into the computer, such as new bills for accounts payable, new invoices for accounts receivable, and pay data for payroll;
- the types of information you want the computer to store; they might be customer records, cash journal, payroll and employee records, inventory, and customer account records;
- the types of reports you want the computer to generate, such as P&L statements, balance sheets, aged receivables, paycheck and payroll reports, trial balances, and W-2 forms.

Next, gather samples of all the information *(input data)* you plan to enter into the computer, including source documents, new records, record changes, inquiries, and transactions. Then, using pages from your current manual or semi-automated system as examples, gather samples of all the information you want the computer to *store,* such as sales data, employee records, and customer records. With this information, your computer sales representative can help you calculate how much storage space you'll need for your computer (see "Example 3" above).

Finally, you should gather samples of all the reports you want the computer to generate, either on the computer's video monitor or on the printer. The type and format of the forms and reports you want printed will determine the type of printing mechanism you'll need (see "Example 1," above).

With your samples, your computer dealer can help tailor an accounting system to your needs.

Link the Tasks

Writing a job description for a computer would be relatively straightforward if all you wanted the computer to do was financial modeling, or word processing, or accounts payable. Since many business problems can't be solved with a single program, however, it's important to plan for a computer system that integrates the tasks.

Here's an example. Suppose you wanted to produce a budget and provide a summary of it in a cover letter to send to the New York office from your branch office in Houston. Using the computer, you might need a data base program to obtain permanently stored financial information. You might also need a financial modeling program to generate the budget, based on the financial information. And you'd need a word processing program to create the cover letter and summary, as well as an electronic mail program to transmit your report. The computer you work with, then, should be designed so that each program ties into the other.

Coordinating computer programs is a job for a computer supplier experienced in business applications—he/she is a guide who, with a clear idea of your needs, can point you in the direction of the software, hardware, peripherals, and support you'll need for a truly flexible computer system.

How to Buy Software

Software is the bit that curbs the horse. It's the least visible part of the computer system—in fact, you can neither see nor touch it—but without it you can't go anywhere. Under its control, an otherwise mute machine hums busily to work at whatever task is assigned.

You can begin to examine software only after you have a clear idea of the work you want the computer to do. The software you settle on will dictate the configuration of the computer's hardware—its memory size, storage requirements, and operating system. The hardware simply provides the right environment for the software.

Two kinds of software guide a computer—system software and application software. *System software* controls the computer's basic equipment—memory, input/output devices, and file formats. It's either built into the computer or comes with it.

Application software is your first concern. It lets you perform specific tasks, such as build financial models, write reports, update mailing lists, or enter new invoices into accounts receivable. And it usually lets you do these tasks without prior computer experience.

Three Kinds of Application Software

You can take one of three routes to application software: packaged, "off-the-shelf" programs; modified, packaged programs; and custom programs.

Packaged Software

Packaged software is undoubtedly as much to be credited for the personal computer revolution as personal computers themselves. Packaged programs are like factory-built cars; they're relatively inexpensive, available instantly, and readily serviced. Also like factory-built cars, packaged programs may not always fit your requirements perfectly, but they're usually quite adequate if you're willing to adapt a little.

Thousands of excellent packaged, "off-the-shelf" programs account for the enormous flexibility the personal computer offers. In addition, these programs are usually reasonably priced. (In the U.S., costs for business programs range between $50 and $1,500.) They're easy to use, highly reliable, and readily available since they are distributed nationally through retail computer stores.

You'll hear the words "user friendly" to describe many off-the-shelf software packages. That means the programs are designed for people with no particular computer experience or training. When you use one of these programs, the computer might guide you by offering a list or "menu" of the program's operations from which you can choose, as well as questions for you to answer with a simple yes/no, and short "help" reviews at the touch of a key.

Modified, Packaged Software

Modified, packaged software is the hybrid—the semi-custom car—that combines off-the-shelf and custom software programs. When packaged software cannot meet the unique needs of some businesses, it may serve as a foundation for other programs that computer dealers or programmers develop. Minor modifications—such as adding the company name and logo to printouts, or changing the arrangement of a form—are usually easy to make and add little to the cost of the software. Major modifications, on the other hand, can cost as much as a custom-written program.

Custom Software

Custom software is theoretically the best way to get any job done. Like the custom-built car, it is precisely tailored to individual business needs. Usually, though, custom programs are impractical for personal computing applications. The cost to develop them—anywhere from $10,000 to $50,000—is usually prohibitive.

The time it takes to write and "debug" a program (correct the errors) is also costly. Even then, not all bugs are easily or immediately found, and they can show up in a program months later.

If your business requires custom programs, however, you can have them written by consulting programmers or software companies that offer programming services. When you retain a programmer, choose carefully. Talk with his or her former clients and find out if their programs do the work intended. How much time did it take to develop them? Are they well documented? Did the programmer provide follow-up support?

Thousands of excellent packaged, "off-the-shelf" computer programs account for the enormous flexibility the personal computer offers.

How to Evaluate Software

Keep these guidelines in mind when you compare different software packages:

- Stick with established, tested software that's widely used. Avoid new-to-the-market programs unless they're distributed by a company that's reputable and committed to thorough consumer testing and debugging. New, untried software can have more bugs than a flea circus.
- Look for programs that are "user friendly." If a program is easy to use, you'll enjoy working with the computer and want to find additional uses for it. It also will be easier for you to train others. If the program is complicated, on the other hand, you'll find you avoid using the program as well as the computer.
- Look closely at the instruction manuals ("documentation") that come with the software you're considering. Since the manuals are your primary guide to a program, they should be clearly written and easy to understand. They should, for example, explain how to start and stop the program, perform routine operations, and correct standard errors.
- The "commands" you use with each program to instruct the computer should be logical and easy to remember. For instance, in a typical word processing program, you tell the computer to "save" or "print" text you create. The best programs also have built-in prompts or reviews in case you do forget a command.
- If you use the computer for several tasks, such as financial modeling, word processing, and business graphics (or general ledger, accounts payable, and payroll), look for programs that integrate the tasks. This way, you can easily transfer data from one program to another.
- Talk to people who are using the software you are considering. Ask if the program runs smoothly. Determine the learning time required to make full use of the program. And find out if it's easy to use.
- Test drive the program on the computer you're interested in. Examine it for ease of use and speed in carrying out instructions. How long will it take to run the most complex calculation you want to perform?
- Weigh costs against performance. You may decide to compromise a little on program advantages in favor of a lower price for a similar program. It may be short of your ideal, yet satisfy your main requirements.

How to Buy Hardware

"Nothing to it,"
Smiled the salesman,
"I can show you best;
Just boot the disk into the RAM,
The CPU will do the rest."

Given the dazzling display of buzzwords that shroud the computer in such mystery, it's no wonder that the most conspicuous part of a personal computer system—the physical machinery—is also the most elusive when it comes to evaluation. Particularly for the first-time buyer.

The way to begin is to evaluate hardware in terms of utility. Can the computer run the software you want to use, and can it store the information you need to work with? Will it be able to expand with your evolving needs? Questions like these enable you to evaluate hardware in terms of memory size, the amount of storage space available for your records, compatibility with other computers, compatibility with peripheral equipment, expandability, and service support.

Hardware Components

At first the computer appears to be nothing more than a television attached to a typewriter. On closer inspection, though, you'll find it has four major components:

1. the actual computer and memory bank, housed in a cabinet;

2. a record-player like disk drive that magnetically stores programs and data on "floppy" or "hard" disks (sometimes cassette recorders are used to store information, but they're usually too slow for business uses);

3. a typewriter-like keyboard that allows you to enter information into the computer (*input* device);

4. a video monitor that displays information (*output* device).

In addition, computer hardware often includes "peripheral" equipment, such as a printer (also an "output" device) that produces reports and graphs, or a communication device (modem) that links one computer to another through telephone lines.

The Computer

The computer itself has two parts—the central processing unit (CPU) and a memory bank.

The *central processing unit* (CPU) is the nerve center of the system. Physically, it's a collection of silicon chips, each about the size of a fingernail, containing thousands of miniature circuits. Taking cues from you at the keyboard or from a program in the memory bank, the CPU executes all the instructions necessary to process data, display information on the monitor, and communicate with disk storage devices. A CPU typically is built around a "microprocessor" with a number such as 6502 or Z-80. This is the "brain" of the computer.

You'll probably hear the terms "8-bit" or "16-bit" used to describe different processors. These terms refer to the amount of information, or number of "bits," that the computer can manipulate at once. ("Bit" refers to BInary digiT, the smallest unit of information the processor can recognize. Eight bits constitute a "byte," the equivalent of a single character.) An 8-bit processor is like a van that can carry eight passengers—it can receive 8 "bits" of information at once. A 16-bit processor is the 16-passenger van—it can handle 16 bits at once and is therefore twice as efficient for some classes of operations. It's also more expensive. For many business applications, a computer with an 8-bit processor is perfectly adequate.

The computer's *memory bank* stores programs, information, and instructions. Memory is measured by the number of characters it can store.

It's easier, though, to measure computer memory in terms of either "K", the equivalent of 1,024 characters, or "M", the equivalent of 1,048,576 characters. A computer with "64K" of memory, then, can store approximately 64,000 characters or bytes at one time. A computer with "1M" of memory can store about 1 million characters or bytes at one time.

Some memory is used to store the programs (software) that control the computer's basic operations; some is used to store the programs you need for different applications; and some is used to hold the information you are using. Most businesses use computers with at least 64K of memory.

Disk Storage

Disk storage systems are a sort of electronic counterpart to the office filing cabinet. Composed of magnetic disks and one or more disk drives, a disk storage system provides permanent storage of information you would otherwise lose when you turn the computer off.

Personal computer systems generally offer two types of disk storage: 1) removable, "floppy" disk storage; and 2) fixed, hard disk storage.

Floppy disks are so named because they are circular (usually either 5 1/4 or 8 inches in diameter), made of flexible plastic, and coated with the same kind of magnetic material used for recording tape. For protection, each floppy disk is permanently sandwiched inside a square, cardboardlike jacket.

Floppy disks vary considerably in the amount of information they can store. Typically, however, a single 5 1/4-inch disk can store the equivalent of about 20,000 words or 80 typed pages (100,000 bytes). "Double-density" disks can provide as much as a million bytes of storage.

Using floppy disks offers the possibility of almost unlimited storage capacity, however, because you can remove one from the disk drive and replace it with another. You can store statistical data on one disk, financial summaries on another, employee records on a third, and so on.

Floppy disks also insure privacy. You can take a disk of sensitive information out of the drive and put it in your pocket. And disks are easy to mail.

Because floppy disk storage is both reliable and reasonably priced. It is far and away the most popular storage medium for small computers. Its one drawback is that sometimes a single disk can't hold all the data you need to work with for a specific application, so you need to replace one disk with another to complete work on a single program.

Hard disk storage suits businesses that require greater storage capacity than floppy disks can provide. Hard disks (such as the "Winchester" disks used by most personal computers) are made of magnetically-coated metal. They also can store, in about the same space, 35 to 150 times what a floppy disk can store. That amounts to as much as 20 million characters—enough to handle the most complex transactions. Unlike floppy disks, which are removable, hard disks are "fixed." This means that they're permanently held in the disk drive, away from environmental hazards.

Though hard disk storage systems are more expensive than floppy disk systems, they are less expensive on a per byte basis; they can store large files; and they provide faster access to information.

Disk storage is the personal computer's way of permanently storing information. Typically, there are two types of permanent storage: bottom, 1) removable "floppy" disk storage; and top, 2) fixed hard disk storage.

The Keyboard

The computer's keyboard, or input device, is a close first cousin to the office typewriter. It is your primary means of entering information into the computer.

Typically, a computer keyboard includes most of the characters found on a typewriter, plus special function keys that allow you to delete or repeat characters. Look also for a calculator-style numeric keypad found on more sophisticated personal computer systems. It should be a requirement if you plan to use the computer for numeric applications. (Some systems offer numeric keypads as a separate accessory.)

The Monitor

Like a television, the video monitor—also known as a terminal, output device, or CRT (cathode ray tube)—displays information you need to see in order to communicate with the computer. Unlike a television, however, the monitor also functions as a sort of fluid scratch pad that allows you to manipulate information without having to use paper.

The moment you plug an electronic spreadsheet program into the computer, for instance, the monitor displays the spreadsheet form and perhaps some of the commands you might want to employ. It also displays the figures you enter, "erases" the figures you want to delete, and reenters new information as you dictate. Through the monitor, the program also may call your attention to possible errors, suggest a way to correct them, and then make the necessary changes that you command.

Video monitors display information on a screen just as a television displays images, but because the computer information isn't broadcast, it appears in sharper focus. Monitors are usually described by the number of vertical lines (usually 24) and horizontal characters (40 to 80) that can fit on the screen. Sometimes televisions are modified to serve as video monitors, though they provide considerably less clarity than the CRT and are limited to about 12 vertical lines and 40 horizontal characters.

Look for standard-size monitors (at least a 12-inch diagonal screen) when you evaluate personal computer systems; working for several hours with smaller screens can produce eye fatigue.

How to Evaluate Hardware

When you have identified the different brands of computer hardware that can run the software programs you want to use, compare them for price and performance in these terms:

- *Memory size.* Is there enough memory to support the programs you want to run? If a program needs 40,000 bytes of memory, for example, and system software uses 10,000 bytes, you would need at least 50,000 bytes of computer memory before you can start storing any data of your own.
- *Software support.* What is the range and quality of business programs available commercially for the computer you are considering?
- *Expandability.* Can the computer be expanded as your needs grow? Better systems have expansion areas (sometimes called "slots") that allow you to add more memory, disk storage space, or connectors to other computers when you need them. These slots also are used to link peripheral equipment to the computer. Be sure to find out if the computer system you're looking at will let you add memory and disk storage, as well as peripheral equipment. Some personal computers are built so that you can add one, but not the other.
- *Compatibility.* Is the computer presently compatible with peripheral equipment and with other computers which you might want to work with? Also, when you eventually want to upgrade your system, you should be able to replace the computer without having to replace the software and peripheral equipment.
- *Reliability.* The computer you choose for business is probably going to be heavily used, so it should have a sound reputation for reliability. Most of the electronic components in computers are extremely dependable, but they should be supported by a sound chassis, adequate power, and cooling capacity. Circuit boards should fit snugly into their slots and be easy to remove for servicing.
- *Warranty.* What kind of warranty does the manufacturer provide? Most personal computers come with a limited 90-day warranty on parts and labor; others offer extended limited warranties as well.
- *Service support.* What kind of service support does the manufacturer offer? Since most personal computer systems are sold through authorized computer retail outlets, support typically comes through computer dealers. The best ones, besides maintaining and updating your system, will help install your system, make minor program modifications, provide training support, and locate special applications software.

Printers and Other Computer Peripherals

The world of computer peripherals—all the accessories that are linked to the computer's main system—is fairly jammed with printers, plotters, modems, graphic tablets, cameras, voice and music synthesizers, voice recognition devices, game paddles, and other paraphernalia designed to extend the computer's usefulness.

A printer, however, is probably the first and most important peripheral device you'll add to your system. It generates printed financial summaries, letters, mailing labels, paychecks, and forms you need to carry out normal business operations. (Plotters are devices that draw charts and graphic images, though some printers can do this as well as print text.)

Printers

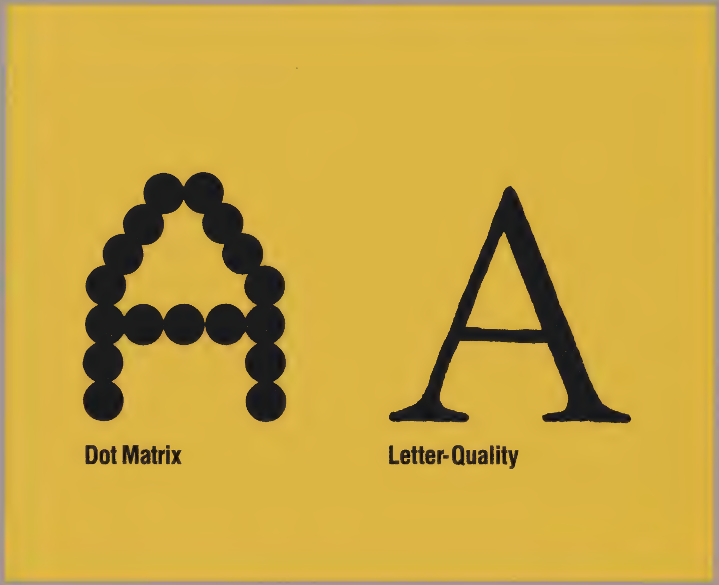
Printers used with personal computers fall into three general categories: low-cost thermal dot matrix printers; impact dot matrix printers; and letter-quality impact printers.

Thermal Dot Matrix Printers

Thermal printers are the most economical. They are also fast, quiet, and highly reliable, because they are simplest in construction, and because they produce characters on paper without the use of type elements. These printers use rolls of heat-sensitive paper to produce text as well as detailed graphs. A thermal printer is generally suitable for draft-quality projects, but not for those that require letter quality results. Also, heat-sensitive paper deteriorates over time and is not suitable for long-term storage.

Impact Dot Matrix Printers

Impact dot matrix printers—fastest of the three—create text characters with a series of closely-spaced dots. The dots are imprinted on the paper at the rate of 100 characters per second (cps) or better. (For the sake of comparison, a typewriter can produce 10 to 15 cps.) Impact dot matrix printers are usually used for business applications that require low-cost, multicopy printing. In terms of both quality and price, the impact dot matrix printer stands between the thermal dot matrix printer and the letter-quality printer, with some of the newest models capable of producing near letter-quality type.



Characters produced by dot matrix printers are made of closely spaced dots. Letter-quality printers produce solid characters of better than typewriter quality.

Letter-Quality Impact Printers

Letter-quality impact printers, the most sophisticated and costly of the three, produce documents of better than typewriter quality, at a typical average speed of 45cps. These printers are called "daisywheel" printers because a daisy-shaped wheel of characters, analagous to a ball of typewriter characters, is what imprints characters on the paper.

Daisywheel printers can produce form letters on letterhead stock, as well as financial statements in widths to 156 characters. It's also possible to change their type fonts, sizes, and pitch to suit different needs.

(If you use the computer for business graphics, you may also want to investigate different plotters, which produce presentation-quality graphs, sometimes in color, with pens that "draw" onto paper.)

Your needs will largely determine the type of printer you purchase. The better printers, however, usually are capable of offering:

- upper and lower-case letters;
- proportional spacing;
- both friction (for single page printing) and adjustable tractor feed (for continuous form printing);
- multiple type fonts;
- expanded and compressed printing;
- printing on various paper widths;
- printing of preprinted forms, labels, and envelopes.

Modems

If you plan to use your personal computer to tie into an interoffice network or commercial data base, you will also need a modem (MOdulator/DEModulator). This is a device that links one computer to another, normally over telephone lines. It translates electrical signals into sounds suitable for telephone transmission and reverses the procedure when information comes into the computer over the telephone. Costs for modems vary according to the number of features they offer, and the speed (or "baud" rate) with which they transmit signals. Typical low-cost business modems operate at 300 and/or 1200 baud (30 and/or 120 characters per second).

How to Buy Service

"Handholding" is its industry nickname, but whatever name service goes by, it's as important a component in the personal computer system as hardware and software.

For most personal computer systems, service support comes through independent computer dealers who can:

- recommend software and hardware that meet your unique requirements;
- install the system;
- provide training;
- arrange, if necessary, for software modifications; and
- provide follow-up hardware and software maintenance.

A modem (MOdulator/DEModulator) uses the telephone to link one computer to another.

Many dealers, in fact, consider their consultation and service as important as the products they sell. They make every effort to offer professional assistance, as well as a broad range of software programs and computer hardware. Aside from providing software/hardware support and service, these suppliers also can refer you to trade shows, computer user groups suited to managers and professionals, and computer consultants and programmers who can provide software modification.

Dealers who specialize in personal computers for large companies are particularly trained to help companies introduce, purchase, and support large numbers of personal computers.

Choosing a Computer Dealer

You should select a computer dealer as carefully as you would an accountant or attorney—because the one you choose will play an important, long-term role in helping you select and maintain personal computer systems. Visit several independent computer dealers (see "Where to Shop for Products and Services," page 43), evaluating them in light of these points:

- Your computer dealer should have a clear understanding of the business you're in. One with expertise in educational software may be well suited to advise customers in the field of education and training, but may not have the background to address business problems.

- Look for a supplier with experience assembling personal computer systems similar to the one you need. Ask for names of customers who have implemented programs you are considering, and talk to several of them.
- Your dealers should have a sound business reputation and a solid track record for fast and reliable service support. (Again, ask for, and be sure to check, references.)
- Choose a dealer who is geographically near enough to provide maintenance and repairs when required. If you have to send a computer you depend on 2,000 miles away for a simple repair, the time you're without computer power could stretch into months.

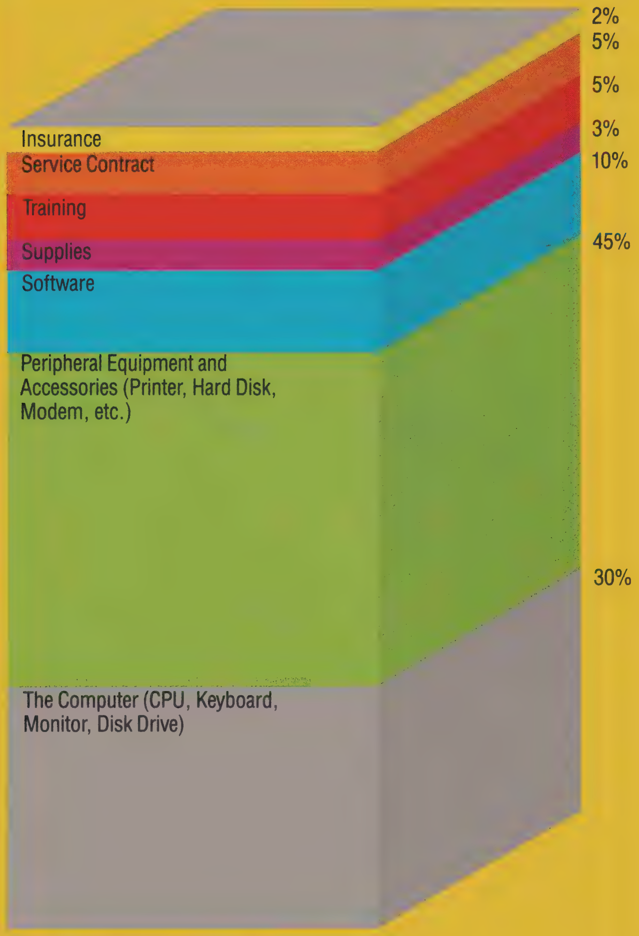
The Service Contract

Personal computers generally enjoy an excellent reputation for reliability, because the components themselves are manufactured under strict standards of quality. Like people, though, almost every computer may have a bad day now and then, and "crash."

For that reason, many computer suppliers provide service contracts that cover parts and labor on repairs, and include a schedule for routine preventive maintenance. (Without a contract, computers are serviced on a straight time and materials basis.)

The price of a service contract varies from one manufacturer to the next. Typically, however, you're charged either a flat rate or a percentage (usually one or two percent) of the cost of the system. (Rule of Thumb: The more costly the service contract, the less confident the manufacurer is of its product.)

What's in the Cost of a Personal Computer System? *



* Plus, if necessary, fees for custom programming

How Much Will the Computer Cost?

It's been estimated that, if automobile production costs had dropped, and features had improved, as rapidly as they have for computers over the last few years, a Rolls Royce would run you around $2.75, it would get three million miles to the gallon, and deliver enough power to drive the Queen Elizabeth II.

That's how dramatically improvements in technology have affected the price, efficiency, and power of computers. With personal computer systems often costing less than $5,000, you can look for a twofold payback—in the money you save and make putting the computer to work for you, and in the benefits that new tax laws provide (see "Your Computer and the IRS," following).

How to Estimate Computer Costs

To price a personal computer system, prepare an estimate like the one shown at right, itemizing the costs for software, hardware, peripheral equipment, and supplies. Remember also to include installation and training costs, insurance, and the cost for an extended warranty or service contract.

When you estimate costs for training, include both the out-of-pocket expenses for classes or seminars you take, and the cost of office time necessary to learn enough about a program to put it to work. A financial modeling program, for example, may take a half-day of your time before you can make rudimentary use of it. Other programs, depending on their complexity, require more or less orientation time.

You'll find that costs for formal training vary widely—from $75 to $100 for a six- to eight-hour class on a particular application, to $1,000 or more for an intensive, week-long computer literacy course.

Financing

You can buy or lease a personal computer system, but the direction you take will hinge on your financial situation. Your tax accountant or attorney can help you decide on the most advantageous route.

Direct Purchase

Under normal circumstances, the cheapest way to buy a personal computer is to pay cash. Cash eliminates the high cost of the borrowed dollar. You neither tie up future income, nor commit yourself to interest charges on a depreciating asset.

System Pricing Worksheet

Hardware

Processor, disk drive, and keyboard $ ____
Additional memory ____ K $ ____
Additional disk drives ____ @ $ ____ /drive $ ____
Monitor $ ____
Printer:
Thermal $ ____
Dot Matrix $ ____
Impact $ ____
Line $ ____
Paper catcher $ ____
Cover $ ____
Language cards $ ____
Interface cards
Serial $ ____
Printer $ ____
Other $ ____
Graphics tablet $ ____
Modem $ ____
Total Hardware $ ____

Software

Systems software $ ____
Utilities $ ____
Applications:
Financial modeling $ ____
Business graphics $ ____
Word processing $ ____
Project management $ ____
General ledger $ ____
Accounts payable $ ____
Accounts receivable $ ____
Payroll $ ____
Job costing $ ____
Data base management $ ____
Inventory control $ ____
Mail list $ ____
Other $ ____
Software modifications $ ____
Custom software $ ____
Total Software $ ____

Accessories & Supplies

Floppy disks ____ @ $ ____ $ ____
Paper $ ____
Forms $ ____
Disk storage cases $ ____
Furniture $ ____
Total Accessories $ ____

Service Contract $ ____

Training $ ____

Installation $ ____

Insurance $ ____

TOTAL ESTIMATED COST $ ____

Leasing

In the face of rising inflation, however, cash-conscious businesses may lean toward leasing as a practical, readily available source of financing. Though more expensive than direct-purchase buying, leasing requires no initial out-of-pocket expenses such as a deposit or down payment. In addition, taxes, delivery, software, and other costs that are not typically financed by a bank can be included in the cost of a lease.

Your Computer and the IRS

Of the 109 provisions logged into the "Economic Recovery Tax Act of 1981," 3 provisions give a particular boost to computer owners and lessees. They provide a full write-off for many personal computers, as well as new rates for depreciation and investment tax credit.

One new tax law provision allows businesses to deduct, in the same year, the first $5,000 of equipment acquired in 1982 and 1983; the first $7,500 in purchases in 1984 and 1985; and the first $10,000 of purchases after 1985. That means an immediate full write-off for many personal computer systems. And if the cost of your computer exceeds the deduction you can take, you can capitalize and depreciate the excess under new methods of depreciation.

Or, under the new Asset Cost Recovery System (ACRS), you can depreciate the cost of your computer over a five-year period, using specific rates for each year: 15 percent the first year, 22 percent the second, and 21 percent in the next three years. If you're using your computer for research and development, you can write it off over a three-year period. (And if you can't take advantage of these tax deductions because of other deductions or business losses, you can take a slower write-off over a twelve- or twenty-five-year period.)

Third, you'll be able to claim a larger investment tax credit for computer purchases you depreciate under the ACRS. You can claim a 10 percent investment tax credit for business equipment with a five-year life, where prior law allowed you to claim only two-thirds of 10 percent.

This is only a brief summary, and since tax situations vary so widely, you should consult with your tax accountant or attorney to examine provisions that concern you.

Where to Shop for Products and Services

Before 1975, you wouldn't have been able to find a "computer store" no matter how meticulously you scoured the countryside. They simply didn't exist. If you wanted a computer before 1975, you went through the manufacturer.

Today, thousands of computer stores dot the globe, many specializing in small computer systems. Some manufacturers also sell their products through department stores and office equipment suppliers.

Computer Stores

Start with independent computer stores when you begin looking at personal computer systems. They are staffed by professionals who can introduce you to different software and hardware, provide ongoing service support (see "How to Buy Service," page 41), and steer you, as we've said, in the direction of trade shows, seminars, computer clubs geared to managers and professionals, and consultants and programmers capable of modifying software.

Talk to colleagues who have had personal computer systems installed and ask for their recommendations of dealers, or look under "Computers" or "Data Processing" in the Yellow Pages of your telephone directory for stores near you.

Sources of Information

Computer magazines, computer clubs, trade shows, and seminars all can provide valuable information about personal computers.

Look for articles on personal computers in magazines such as *Personal Computing, Popular Computing, Creative Computing, BYTE, Desktop Computing, Interface Age* and others. Also watch for articles in your own professional or trade journals; many have begun to regularly address the subject of personal computers as management tools.

You also can benefit from participation in a computer club, or "user group." Hundreds of user groups reflect the varied interests of new personal computer buyers, including executives, financial analysts, commodities traders, doctors, farmers, and attorneys. International Apple Core (IAC), for example, represents more than 400 groups worldwide with membership exceeding 60,000; it also publishes a bi-monthly magazine. Your computer supplier can help direct you to clubs designed for people with business interests.

Computer trade shows are another good place to find out about the software and hardware available for personal computers. During the shows, many manufacturers offer free seminars on product and software applications. (Check with a computer supplier or computer magazine to find out when trade shows are in your area.)

There are also some excellent short courses and seminars available to the business community. They're available through universities and community colleges, independently operated computer training centers, and organizations such as the American Management Association.

■

Questions and Answers

Q. If I buy a computer today, will it be obsolete tomorrow?

A. If sizzling technology is your single criterion for evaluating computer systems, yes. The electronics industry is changing so rapidly that almost every product it develops is, from a purely technical standpoint, obsolete before it ever goes on sale.

If you judge computers in terms of **utility**, however, you'll find many that never lose their value. As long as it does the job you want it to do, a computer is never obsolete. The computer that today allows you to develop financial models, or carry out accounting tasks, or create graphs will do the same things tomorrow. Just be sure you buy a computer that belongs to a family of upwardly-expandable equipment so your computer can accommodate the growth of your business—the only thing that can really render a computer obsolete.

Q. Shouldn't I wait until prices go down?

A. The wait-or-buy-now question is best answered by another: Do you need a computer now? If not, wait. But if a computer could help your business now, invest now. Not buying a computer when you need one is like not buying any other equipment your business needs in order to function smoothly.

Q. How long does it take to learn to use the computer?

A. Learning to use a computer probably takes less time than learning to drive a car, and most people think learning to drive a car is a fairly simple process. The fact is that computers seem complicated because they're so new. Once you're around them, though, you begin to understand them quickly.

To familiarize yourself with the mechanics of using a personal computer—operating programs, using the keyboard, loading and saving data—you'll need only a few hours on some systems, as much as 20 to 40 hours on others.

To learn how to operate different programs (word processing and financial modeling, for instance), you'll need varying amounts of time, depending on the complexity of the programs. Many new computer users have found that by using self-teaching manuals and the training drills provided in them, they can start using word processing programs with less than a day's study. Others find they can put a graphics program to work "almost right away" and have full command of it within a week of daily work. Financial modeling programs, because they often perform more complex tasks, require about a week's work before they can be effectively employed...and as long as a month to master.

Q. What about computer errors—aren't they a big problem?

A. In the words of at least one computer philosopher, "To err is human, and so is blaming the error on the computer." The fact is, a computer makes mistakes in about the same way a typewriter makes typographical errors—with the assistance of the operator. It does not eliminate human failure.

So, if you work with computers, you can expect to run into errors periodically. Some of them result from hardware errors ("bugs" in the design of the computer itself) or software errors ("bugs" in the software); but most result from operator errors, especially when entering new data.

You can significantly reduce the possibility for error, however, if you buy 1) hardware from a manufacturer committed to product quality, 2) software that has been time tested and proven reliable, and 3) software with "error-catching" controls. These controls can call an operator's attention to potential errors, such as those found in unusually small or large figures, invalid codes or account numbers, duplicate entries, or information that might have been entered under the wrong account name (particularly where two account names are similar).

Q. What about my data? If I store it electronically, will it be safe?

A. It all depends. You can destroy the contents of a floppy disk if you accidentally lay it on top of a color television set, or near any other magnetic field that will scramble data. You can also wreck it if you touch its exposed magnetic surface or spill your drink on it, or if you lock it in the car on a hot day.

Essentially, however, storing data electronically is as safe as storing words or music on phonograph records or magnetic tapes. And there are ways to protect yourself from the "Oh-no-I've-lost-my-data" blues.

First, handle disks with the same care you would take to handle a tape cassette or record album. That is,

- handle each disk by the cardboard jacket only;
- keep each disk, when not in use, in its paper envelope;
- keep disks away from magnetic fields created by magnets, electric motors, and television sets;
- don't expose disks to extreme heat (temperatures above 125° F/51.7°C will warp disks in no time).

Second, make "backup" copies of data stored on disks. (You can produce several complete copies of your records in a few minutes.) Having backup disks protects you against the failure of one disk. Some businesses, for example, keep the same data on three different disks that are rotated every week or so—one is kept for use in the computer, another stored in the office, and a third kept off site (perhaps in a safe-deposit box). Storing printed copies of important information offers additional insurance against disaster.

Third, when you're working with data in the computer, be sure to transfer it to a disk at reasonable intervals—usually every ten to fifteen minutes. Here's why: data you're working with in the computer's temporary (random access) memory is vulnerable because it depends on a constant current of electricity to remain accessible. A surge or spike in your electrical current could wipe out the contents of the computer's memory—inconsequential if it only spoils your space wars game, but not if it eliminates hours of important data you've been generating. If you're storing data at intervals, though, and you have a power surge or brownout, you lose only a few minutes of work.

Q. What if the computer breaks down?

A. The computer itself is actually the least delicate component in a computer system. Its integrated circuits have no moving parts and are as rugged as those in a transistor radio. Heavy and prolonged vibration may cause chips to unseat from their sockets, but such vibration would presumably have to be heavier and more prolonged than that undergone by the space shuttle during launch since a personal computer on the shuttle's first flight operated without a hitch.

Still, even the most reputable computers are known to "crash" now and then. If this happens to yours, how quickly can you expect your computer to be operating again? If it's down for more than a few days, can you acquire a substitute with reasonable speed? Obviously, it's important to have a contingency plan, so check with your computer dealer when you investigate different computer systems. Find out what provisions can be made for you if your computer does need service.

apple
profile
apple ///
disk II
monitor ///
apple II
Quick File III Sampler
VISICALC III
Pascal
Apple II Senior Analyst
Apple II Senior Analyst
Apple III VISICALC
Senior Analyst

The Case for Apple

Whatever business you're in, we want you to invest in Apple personal computers. We have refrained, however, from making Apple the hero of this book. Readers see through that sort of thing, and, besides, when people draw their own conclusions about personal computers, Apple does pretty well. Here's why:

First. Apple has more experience with personal computers than anyone. We *invented* them. They're all we do. And in spite of growing competition from other companies—including rivals 100 times our size—Apple is still recognized as the industry leader. We build into Apple products a level of quality, performance, and value that has earned the respect and loyalty of more than half a million of customers.

Second. Apple systems are the most flexible personal computers available. Our own product line includes a growing family of compatible hardware, software, and peripheral equipment. More than 300 independent companies have also developed hardware and software for Apple systems. Add these to Apple's product line and you have a vast array of computer products that can be tailored to meet a wide range of business and professional needs—including our own.

At Apple, *everyone* uses Apples. The Sales Department uses them for sales forecasting, trend analysis, management reports, client tracking, commission tracking, and direct mail advertising. Management Information Systems uses them as part of a company-wide electronic mail system, and to consolidate field sales forecasts. Our service centers use them for inventory control, customer billing, and profit and loss statements. And, naturally, we used an Apple to write this book.

Third. Apple systems support more packaged software than any other personal computer. Literally thousands of programs are commercially available to run on Apple computers—more than for any other computer ever made. And by simply plugging in additional circuit boards, an Apple computer will run hundreds of programs written for other computers.

Fourth. Apple is famous for its clearly written, self-teaching instruction manuals. You'll also find a wealth of help and information in Apple dealers' training classes and in business and professional Apple users' groups.

Fifth. Apple's commitment to quality and reliability is reflected in a product repair record that is the envy of the industry. Our quality assurance department inspects all components and materials prior to assembly to ensure conformance to Apple's stringent quality standards. Then, after assembly, our manufacturing department tests every computer at least six more times, operating it continuously for days to make sure it's functioning properly. Only then is it shipped.

Sixth. We've created a worldwide network of service and support you can count on. At more than 2,500 service centers worldwide, you can find full-support dealers who are trained to evaluate your needs and suggest the combination of system, software, and peripherals that would best meet them. In addition, Apple has instituted a National Account Program for corporations that need to introduce, purchase, and support large numbers of computers for their organizations.

Seventh. Apple has developed the most extensive service program of any personal computer company—a program that lets you choose the level of support that's right for your needs. All parts and repairs on Apple systems are covered automatically by our Level 1 service agreement—under the original warranty for the first 90 days. Apple owners can also purchase Apple Care (a carry-in service contract, renewable in one year increments) that protects them against service costs on Apple-manufactured products for one year. And National Account customers can arrange to obtain on-site service that covers all Apple-manufactured products as well as many Apple-compatible products developed by other companies.

These are just some of the reasons why Apple is the best selling personal computer in the world. You're sure to find other reasons when you visit your authorized Apple dealer. Or when you talk with any of the half million people who drew their own conclusions and bought an Apple personal computer.

We think you may do the same.

A Brief Dictionary of Computerese

No doubt Webster would incandesce over the number of new words born to the world through computers. The speedy evolution of so many new terms, in fact, has virtually produced a new English dialect—computerese. You'll find that the technology itself is responsible for terms like "bit" and "CPU"; others, like "input" and "documentation," give new meaning to the familiar.

Acoustic Coupler *A mechanical device that allows a telephone hand set to be connected to a modem; also used to refer to the entire modem. See Modem.*

Address *A number that identifies the specific location in the computer memory where a piece of information is stored.*

Alphanumeric *Characters consisting of letters and numbers, as opposed to special characters. See Special Characters.*

Application Software *Software designed to accomplish a specific task such as accounting, financial modeling, or word processing. See Software.*

ASCII *American Standard Code for Information Interchange; computers use binary numbers (combinations of ones and zeros) to represent letters, numbers, and special characters; the ASCII code specifies which binary number will stand for each character and provides a standard that allows computers from different manufacturers to "talk" to each other.*

Assembly Language *A means programmers use to communicate with a computer; assembly language is a type of "low-level" computer language that lies between "high-level" languages such as BASIC and Pascal, and machine language (the fundamental codes of the computer). See Language.*

Backup *An extra copy of information stored on a disk. If the program or other data stored on the first disk is damaged, it is still available on the backup copy.*

BASIC *Beginners All-purpose Symbolic Instruction Code; the most popular language for personal computers. See Language.*

Baud *A measure of the speed at which computer information travels (normally between a computer and a peripheral or between two computers). A baud is about equal to one bit per second.*

Binary *A word used to describe a number system that uses only ones and zeros; an efficient way of storing information in a computer since the microscopic switches in a computer can only be ON (1) or OFF (0).*

Bit *BInary digiT; the smallest piece of information (either a one or a zero) that the computer can handle at one time; eight bits constitute one byte.*

Boot *To start the computer.*

Bug *An error; a hardware bug is a malfunction or design error in the computer or its peripherals; a software bug is a programming error.*

Bus *The means used to transfer information from one part of a computer to another.*

Byte *The basic unit of measure of a computer's memory, representing a single alphanumeric character (A, B, C, 1, 2, ?, &, etc.); the equivalent of eight bits.*

CAI/CAT *Computer-assisted instruction/Computer-assisted training; education or training that involves the use of the computer to instruct and monitor student performance.*

Central Processing Unit *See CPU.*

Character *A single letter, number, or other symbol; in a small computer, a character is normally eight bits or one byte.*

COBOL *COmmon Business-Oriented Language; a computer language developed specifically for business use. See Language.*

Command *A word or character that causes a computer to perform a specific task.*

Computer *Any device that can receive, store, and act on a set of instructions in a predetermined sequence, and that permits both the instructions and the data upon which the instructions act to be changed. The distinction between a computer and a programmable calculator is that the computer can manipulate text as well as numbers, whereas the calculator can only handle numbers.*

Computer Program *A series of commands, instructions, or statements put together in a way that tells a computer to perform a specific task or series of tasks.*

CP/M® *Control Program for Microprocessors; the name of a specific operating system. See Operating System.*

CPU *Central processing unit; the part of the computer that collects, decodes, and executes instructions; often made up of a microprocessor and associated circuitry.*

CRT *Cathode ray tube; the television-like tube that displays information used in a program; also called monitor or video monitor.*

Cursor *A flashing or nonflashing square or arrow that appears on the computer's monitor to indicate where the next character of text or data will appear.*

Custom Software *A computer program that is custom-designed to meet a particular user's specific need.*

Data *All information, including facts, numbers, letters, and symbols, which can be acted on or produced by the computer.*

Data Base *A collection of related information, such as found on a mailing list, that can be stored in the computer and retrieved in several ways.*

Debug *To go through a program or hardware device to correct mistakes.*

Disk *A flat, circular device that resembles a phonograph record and is used to store information and programs for the computer. Two types of disks are used with personal computers: floppy disks (or diskettes) and hard disks. See Floppy Disk, Hard Disk.*

Disk Drive *The machinery that operates either a floppy or hard disk, rotating it at high speeds to read information stored on the disk or to write new information on it.*

Documentation *Instructional materials that describe the operations of an individual computer program or a piece of system hardware.*

Dot Matrix Printer *A type of printer that forms characters of multiple dots. See Printer.*

Downtime *Any period of time when the computer is not available or not working.*

Electronic Mail *Sending and receiving information by computer.*

Floppy Disk *A flexible plastic disk, enclosed in a cardboard jacket, that stores information generated by the computer; in small computers, usually either 5 1/4" or 8" in diameter.*

Format *As a noun, the physical form in which information appears; as a verb, to specify parameters of a form or to write address codes on a blank disk in preparation for using it to store data or programs.*

FORTRAN *FORmula TRANslation, a high-level computer language used primarily for mathematical computations; though FORTRAN is available for some small computers, it is mainly used with large computer systems. See Language.*

Hard Copy *Printed information generated by a computer. See Printer.*

Hard Disk *A magnetically coated metal disk, usually permanently mounted within a disk drive; capable of storing 30 to 150 times more information than can a floppy disk; also called Winchester disk.*

Hardware *The physical components of a computer system, particularly the CPU, disk drive, video monitor, and keyboard.*

High-Level Language *A programming language that allows a person to give instructions to a computer in English rather than in the numerical (binary) code of ones and zeros; BASIC, COBOL, and Pascal are examples of high-level languages. See Language.*

Impact Printer *See Printer.*

Input *Information entered into the computer by means of a keyboard, graphic tablet, or other mechanism.*

Input/Output (I/O) *Software or hardware that exchanges data with the outside world.*

Interactive *Describes a computer system in which a two-way conversation occurs between the user and the computer.*

Interface *A piece of hardware or software used to connect two devices (usually the computer and a peripheral) that cannot be directly hooked together.*

Language *A code that the computer understands; low-level languages resemble the fundamental codes of the computer; high-level languages (such as BASIC and COBOL) resemble English.*

Letter-quality Printer *A printer, usually an impact printer, that generates documents of typewriter quality. See Printer.*

Line Printer A type of high-speed computer printer that prints an entire line at a time, rather than one character at a time.

Machine Language The "native language" of a computer; the fundamental symbols, usually ones and zeros, that the computer is capable of recognizing and to which it can respond.

Memory The part of the computer that stores program instructions and data; memory size is measured by the number of characters (bytes) it can store, in terms of "K" (1024) or "M"; 64K = 65,536 bytes, 1M = 1,048,576 bytes). Also called "user memory." See RAM, ROM.

Menu A list of operations or commands available in a computer program, usually displayed on the computer screen when the program begins.

Microcomputer A computer based on a microprocessor. See Microprocessor.

Microprocessor Core of the central processing unit of a computer; it holds all the essential elements for manipulating data and performing arithmetic calculations.

Modem MOdulator-DEModulator; a device that converts a computer's electrical signals into audible sounds (modulation) for transmission over the telephone, and back again (demodulation) for reception via telephone; used to link one computer to another.

Monitor See CRT.

Network A structure capable of linking two or more computers by wire, telephone lines, or radio links.

Operating System A group of programs that act as intermediaries between the computer and the applications software; the operating system takes a program's commands and passes them down to the central processing unit in a language that the CPU understands; application programs must be written for a specific operating system such as DOS, SOS, CP/M, and others.

Output Information the computer transmits; this is done by means of a video monitor, printer, or other mechanism.

Packaged Software Computer programs that are available commercially through retail stores.

Parallel Two or more computer operations happening at the same time; a parallel interface is one that receives and sends out a number of bits at the same time. See Serial.

Pascal A high-level programming language with a larger, more sophisticated vocabulary than BASIC, used for complex applications in business, science, and education; named after the 17th-century French mathematician.

Peripheral Hardware, such as a printer or modem, attached to the computer in order to perform a specific function.

Plotter A printing mechanism capable of drawing lines rapidly and accurately for graphic representation.

Printer A mechanism that reproduces, in printed form, the information entered into or generated by the computer; impact printers make impressions by physically striking a ribbon and paper, thermal printers make impressions by applying heat to heat-sensitive paper; some printers can produce graphs as well.

Printout A printed copy of information produced by the computer. See Hard Copy.

Program A sequence of instructions that the computer can understand and execute.

RAM Random Access Memory; the part of the computer's memory that allows both reading and writing, as opposed to ROM (Read Only Memory). See Memory, ROM.

RF Modulator A device that lets a personal computer use any ordinary television set for a monitor; also called a modulator.

ROM Read Only Memory; the part of the computer's memory that allows just reading and is used to hold information that never changes, such as a computer language.

Save To store a program on a disk or somewhere other than in the computer's memory.

Serial Computer operations occurring in sequence; a serial interface is one that receives and sends out one piece of information at a time. See Parallel.

Software Instructions that operate the computer hardware; system software is used for the computer's general tasks or functions (such as operating a printer or understanding BASIC); application software is used to accomplish a specific task, such as financial modeling or word processing.

Special Characters Characters that can be displayed by the computer, but that are neither letters nor numbers, such as &*$()<> + ©,.

System An organized collection of hardware, software, and peripheral equipment that works together.

Telecommunication Transmission of information between two computers in different locations, usually over telephone lines.

Terminal A piece of equipment used to communicate with a computer, such as a keyboard for input, or a video monitor or printer for output.

Thermal Printer See Printer.

Timesharing A process whereby the facilities of a single (usually large) computer are shared by a number of users.

User Group An association of people who meet to exchange information abut a particular computer or group of computers.

Video Monitor The computer picture screen; also called monitor, CRT.

Window A portion of the computer's video display that is dedicated to a special purpose.

Word Processing The entry, manipulation, editing, and storage of text using a computer.

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